Sun Storage 7000 Unified Storage System Service Manual

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Preface

The *Sun Storage 7000 Unified Storage System Service Manual* contains hardware overviews and maintenance procedures for the Sun Storage 7000 series of NAS appliances.

This documentation is also available while using the Browser User Interface, accessible via the Help button. The appliance documentation may be updated using the System Upgrade procedure documented in Chapter 1 of this book.

Who Should Use This Book

These notes are for users and system administrators who service and use the Sun Storage 7000 server appliances.

Related Documentation

Refer to the following documentation for installation instructions, hardware overviews, service procedures and software update notes.

- Installation Guide and Administration Guide (`http://wikis.sun.com/display/fishworks/documentation/`)
- Release Notes (`http://wikis.sun.com/display/fishworks/software+updates`)

Third-Party Web Site References

Third-party URLs are referenced in this document and provide additional, related information.

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Documentation, Support, and Training

The Sun web site provides information about the following additional resources:

- Documentation (`http://www.sun.com/documentation/`)
- Support (`http://www.sun.com/support/`)
- Training (`http://www.sun.com/training/`)

Typographic Conventions

The following table describes the typographic conventions that are used in this book.

TABLE P–1 Typographic Conventions

Typeface	Meaning	Example
`AaBbCc123`	The names of commands, files, and directories, and onscreen computer output	Use the `help` command to show available actions. `Last login: Mon Oct 13 15:43:05 2008 from kiowa`
`AaBbCc123`	What you type, contrasted with onscreen computer output	`caji console login: root` `Password:`
aabbcc123	Placeholder: replace with a real name or value	To view an individual property, use `get` *propertyname*.
AaBbCc123	Book titles, new terms, and terms to be emphasized	Read Chapter 6 in the *User's Guide*. A *cache* is a copy that is stored locally. Do *not* save the file. **Note:** Some emphasized items appear bold online.

CLI Prompts in Command Examples

The following table shows the default Command Line Interface prompts for the appliance.

TABLE P–2 CLI Prompts

Type	Prompt
Appliance CLI	`machine_name:>`

◆ ◆ ◆ CHAPTER 1

Introduction

Overview

Introduction

The Sun Storage 7000 Unified Storage family of products provide efficient file and block data services to clients over a network, and a rich set of data services that can be applied to the data stored on the system.

Platforms

- Sun Storage 7110
- Sun Storage 7210
- Sun Storage 7310
- Sun Storage 7410
- Sun Disk Shelf J4400/J4410/J4500

Protocols

The Unified Storage products include support for a variety of industry-standard client protocols, including:

- CIFS
- NFS
- HTTP and HTTPS

- WebDAV
- iSCSI
- FC
- FTP
- SFTP

Key Features

Your Sun Storage system also includes new technologies to deliver the best storage price/performance and unprecedented observability of your workloads in production, including:

- Analytics, a system for dynamically observing the behavior of your system in real-time and viewing data graphically
- The ZFS Hybrid Storage Pool, composed of optional Flash-memory devices for acceleration of reads and writes, low-power, high-capacity disks, and DRAM memory, all managed transparently as a single data hierarchy

Data Services

To manage the data that you export using these protocols, you can configure your Sun Storage system using the built-in collection of advanced data services, including:

- RAID-Z (RAID-5 and RAID-6), mirrored, and striped disk configurations
- Unlimited read-only and read-write snapshots, with snapshot schedules
- Data deduplication
- Built-in data compression
- Remote replication of data for disaster recovery
- Active-active clustering for high availability (7310 and 7410)
- Thin provisioning of iSCSI LUNs
- Virus scanning and quarantine
- NDMP backup and restore

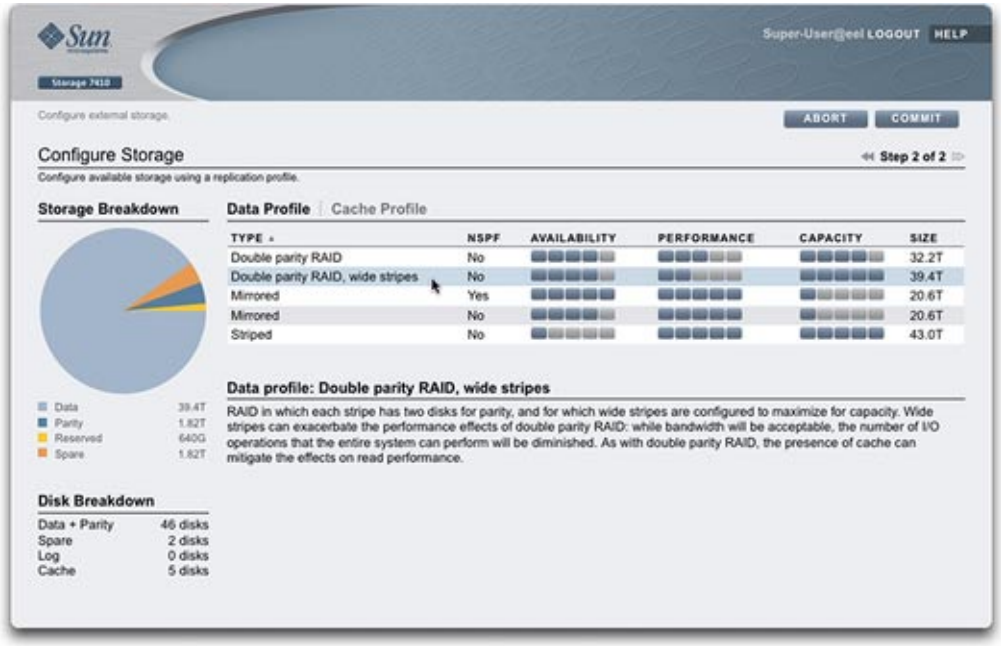
Availability

To maximize the availability of your data in production, the Sun Storage products include a complete end-to-end architecture for data integrity, including redundancies at every level of the stack. Key features include:

- Predictive Self-Healing and diagnosis of all system hardware failures: CPUs, DRAM, I/O cards, disks, fans, power supplies
- ZFS end-to-end data checksums of all data and metadata, protecting data throughout the stack
- RAID-6 (DP) and optional RAID-6 across disk shelves
- Active-active clustering for high availability (7310 and 7410)

- Link aggregations and IP multipathing for network failure protection
- I/O Multipathing between the controller and disk shelves
- Integrated software restart of all system software services
- Phone-Home of telemetry for all software and hardware issues
- Lights-out Management of each system for remote power control and console access

Browser User Interface (BUI)



The browser user interface

The BUI is the graphical tool for administration of the appliance. The BUI provides an intuitive environment for administration tasks, visualizing concepts, and analyzing performance data.

The management software is designed to be fully featured and functional on the following supported web browsers: Firefox 2.x and 3.x, Internet Explorer 7 and 8, Safari 3.1 or later, and WebKit 525.13 or later.

Direct your browser to the system using either the *IP address* or *host name* you assigned to the NET0 port as follows: https://ipaddress:215 or https://hostname:215. The login screen appears.

Command Line Interface (CLI)

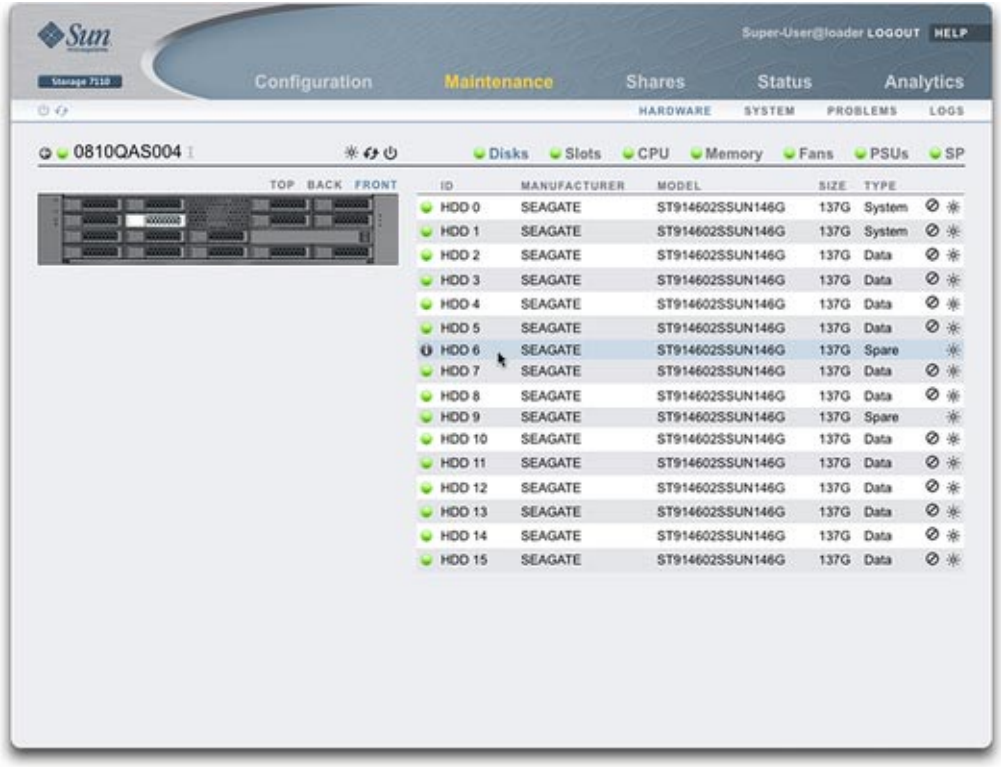
The CLI is designed to mirror the capabilities of the BUI, while also providing a powerful scripting environment for performing repetitive tasks. The following sections describe details of the CLI. When navigating through the CLI, there are two principles to be aware of:

- Tab completion is used extensively - if you are not sure what to type in any given context, pressing the Tab key will provide you with possible options. Throughout the documentation, pressing Tab is presented as the word "tab" in bold italics.
- Help is always available - the help command provides context-specific help. Help on a particular topic is available by specifying the topic as an argument to help, for example **`help commands`**. Available topics are displayed by tab-completing the help command, or by typing help topics.

You can combine these two principles, as follows:

```
dory:> help tab
builtins    commands    general     help        properties  script
```

Hardware



Locating a disk

Hardware View

The Maintenance > Hardware screen (also known as the "hardware view") provides component status of the appliance and attached disk shelves. This information is available from both the BUI and the CLI.

BUI

The BUI hardware view provides interactive illustrations that enable you to browse through the appliance and attached disk shelf components. The screenshot at the top of this page shows a disk highlighted in a Sun Storage 7110, showing both its physical location and details.

The buttons in the hardware view are:

icon	description
	Show a more detailed view of this component
	Leave this detailed view
	Click for more details
	Hardware component is ok (green)
	Hardware component is not present (grey)
	Hardware component is faulted (amber)
	Toggle blinking of the locator LED for this component
	Reboot the appliance
	Power off the appliance
	Offline disk
	Port active
	Port inactive

System Overview

The main hardware page lists the system chassis, a summary of its contents, and any attached disk shelves (on supported systems). This provides an overview of the hardware present on the system, as well as controls to reset or power off the system.

System Chassis

The primary system chassis is shown on the top half of the view. At the top left, click the to get more detail about the chassis. The indicator notes if there are any faulted components within the chassis, and the name of the chassis. The chassis name is initially set to be equal to the appliance name during installation. To change the chassis name, use the entry field on the Configuration > Services > System Identity screen.

At the top right of the system chassis is the control to light the locate LED, reboot the appliance, and power off the chassis. Note that in a 7310 or 7410 configuration, the system chassis does not control the disk shelf power. The reboot and poweroff operations are identical to those provided at the top left of the global sub-navigation bar.

A thumbnail of the system chassis is presented at left. Clicking on the thumbnail or the "Show Details" link takes you to a detailed view of the chassis, and is identical to clicking on the right pointing arrow at the top left of the view.

The following information is presented in a summary view:

Property	Description
Manufacturer	Manufacturer of the system
Model	System model name
Serial	System chassis hardware serial number
Processors	Count and description of processors in the system
Memory	Total memory in the system
System	Size and number of system disks used for the system image
Data	Size and number of data disks in the system chassis. This is only valid for standalone systems. If there are no data disks present, "-" will be displayed.
Cache	Size and number of cache disks in the system chassis. This is only valid for expandable systems that support additional disk shelves. If there are no cache disks present, "-" will be displayed.
Log	Size and number of log disks in the system chassis. This is only valid for standalone systems. If there are no log devices present, "-" will be displayed.
Total	Total size and count of all disks in the system.

Disk Shelves

A list of disk shelves, if supported, is displayed at the bottom of the view. The thumbnail to the left represents the front of the currently selected disk shelf. Clicking on the right pointing arrow or double-clicking on a row within the list will provide complete details about the disk shelf. The state indicator will be orange if the chassis contains any faulted components. The following fields are displayed in the list:

Property	Description
Name	Name of the disk shelf, used in faults and alerts. This is initially set to the serial number of the disk shelf, but can be changed by clicking on the name within the list.
Manufacturer	Disk Shelf Manufacturer
Model	Disk Shelf Model
Data	Total size of all data disks within the disk shelf.

Property	Description
Cache	Total size of all cache disks within the disk shelf. There are currently no supported disk shelves with cache devices, but this may not always be the case. If there are no cache disks within the disk shelf, then "-" is displayed.
Log	Total size of all log disks within the disk shelf. If there are no log disks within the disk shelf, then "-" is displayed.
Paths	Total number of I/O paths to the disk shelf. The only supported configurations are those with multiple paths to all disks, so this should read "2" under normal operating circumstances. Clicking the icon will bring up a dialog with information about each path. This includes which HBAs are connected to the disk shelf, and the state of any paths. If the disks within the disk shelf are not currently configured as part of a storage pool, then complete path information will not be available, though it should still display two paths to the chassis.
Locate	Toggle the locate LED for this disk shelf. If the LED is currently on, then this indicator will be flashing.

Chassis Detail

To view the chassis details, click on the icon (or one of the alternative forms described above). This view includes some of the same controls in the upper left (state, name, locate, reset, poweroff), as well as listings of all the components in the chassis.

At the left is a set of images describing the chassis. If there are multiple views, then you can switch between them by clicking on the name of the view above the image. The following views are supported:

- Front
- Back
- Top
- Mezzanine (Sun Storage 7410 only)

For each view, faulted components will be highlighted in red. In addition, the currently selected component will be highlighted in the image. Clicking on a component within the image will select the corresponding component in the list to the right.

A tab is present for each component type in the following list. Each component type has a state icon which will be orange if there is a faulted component of the given type.

- Disks
- Slots
- CPU (System chassis only)
- Memory (System chassis only)
- Fans
- PSUs (Power Supplies)
- SP (Service Processor) (System chassis only)

Clicking on a component type will display a list of all physical locations within the chassis where components may be present. Clicking on a component within the list will highlight it within the appropriate chassis image. Clicking on the icon while over a row or double-clicking a row will bring up a dialog with detailed information about the component. The information displayed in the list depends on the component type, but is a subset of the information available in the component detail. Disks and service processors support additional operations described below. Each component can report any or all of the following properties:

Property	Description
Label	Human-readable identifier for this component within the chassis. This is typically, but not necessarily, equivalent to the label printed on the physical chassis.
FMRI	Fault managed resource identifier (FMRI) for the component. This is an internal identifier used to identify the component within faults and is intended for service personnel.
Active Problems	For a faulted component, links to active problems affecting the component.
Manufacturer	Component manufacturer.
Model	Component model.
Build	Manufacturing build identifier. This is used to identify a particular location or batch where the component was manufactured.
Part	Component part number. This is the core factory part number. The actual orderable part number may differ depending on whether the component is for replacement or expansion, and whether it's part of a larger assembly. Your service provider should be able to refer you to the appropriate orderable part. For components without part numbers, the model number should be used instead.
Serial	Component serial number.
Revision	Firmware or hardware revision of the component.
Size	DIMM or disk size, in bytes.
Type	Disk type. Can be one of 'system', 'data', 'log', 'cache', or 'spare'. When a spare is active, it will be displayed as 'spare '.
Speed	CPU speed, in hertz.
Cores	Number of CPU cores.
GUID	Hardware global unique identifier.

Disks

Disks support the additional options:

Action	Description
Locate	Toggle the locate indicator for the disk. If the LED is currently turned on, this icon will be blinking.
Offline	Offline the disk. This option is only available for disks that are part of a configured storage pool (including the system pool). Offlining a disk prevents the system from reading or writing to it. Faulted devices are already avoided, so this option should only be required if a disk is exhibiting performance problems that do not result in pathological failure. It is not possible to offline a disk that would prevent access to data (i.e. offlining both halves of a mirror). If the device is an active hot spare, this will also give the option of detaching the hot spare completely. Once a hot spare is detached, it cannot be activated except through another fault or hotplug event.
Online	Online the disk. Reverses the above operation.

Infiniband Host Controller Adapters

Infiniband Host Controller Adapters (HCA) report additional properties for the list of available ports:

Action	Description
State	When "active", the active port icon is displayed. Other valid port states ("down", "init", and "arm") are denoted by the inactive port icon . Mousing over the port icon will display the current port state in the tip pop-up.
GUID	The hardware assigned port GUID.
Speed	The current port speed enabled: SDR, DDR or QDR

Service Processor

The service processor behaves differently from other component nodes. Instead of providing a list of components, it presents a set of network properties that can be configured from the storage appliance. The following properties control the behavior of the service processor network management port.

Property	Description
MAC Address	Hardware MAC address. This is read-only
IP Address Source	One of 'DHCP' or 'Static'. Controls whether DHCP should be used on the interface.
IP Address	IPv4 Address, when using static IP configuration. IPv6 is not supported.
Subnet	Dotted decimal subnet, when using static IP configuration.

Property	Description
Default Gateway	IPv4 default gateway address.

Changing multiple values in conflicting ways (such as changing static IP assignments while in DHCP mode) has undefined behavior.

CLI

Hardware status details are available in the CLI under the `maintenance hardware` section. Use `show` to list the status of all components. The `list` command will list available chassis, which can be selected and then viewed using `show`.

```
tarpon:> maintenance hardware show
Chassis:

             NAME               STATE     MANUFACTURER            MODEL

chassis-000  0839QCJ01A         ok        Sun Microsystems, Inc.  Sun Storage 7410

cpu-000      CPU 0              ok        AMD                     Quad-Core AMD Op
cpu-001      CPU 1              ok        AMD                     Quad-Core AMD Op
cpu-002      CPU 2              ok        AMD                     Quad-Core AMD Op
cpu-003      CPU 3              ok        AMD                     Quad-Core AMD Op
disk-000     HDD 0              ok        STEC                    MACH8 IOPS
disk-001     HDD 1              ok        STEC                    MACH8 IOPS
disk-002     HDD 2              absent    -                       -
disk-003     HDD 3              absent    -                       -
disk-004     HDD 4              absent    -                       -
disk-005     HDD 5              absent    -                       -
disk-006     HDD 6              ok        HITACHI                 HTE5450SASUN500G
disk-007     HDD 7              ok        HITACHI                 HTE5450SASUN500G
fan-000      FT 0               ok        unknown                 ASY,FAN,BOARD,H2
fan-001      FT 0 FM 0          ok        Sun Microsystems, Inc.  541-2068
fan-002      FT 0 FM 1          ok        Sun Microsystems, Inc.  541-2068
fan-003      FT 0 FM 2          ok        Sun Microsystems, Inc.  541-2068
fan-004      FT 1               ok        unknown                 ASY,FAN,BOARD,H2
fan-005      FT 1 FM 0          ok        Sun Microsystems, Inc.  541-2068
fan-006      FT 1 FM 1          ok        Sun Microsystems, Inc.  541-2068
fan-007      FT 1 FM 2          ok        Sun Microsystems, Inc.  541-2068
memory-000   DIMM 0/0           ok        HYNIX                   4096MB DDR-II 66
memory-001   DIMM 0/1           ok        HYNIX                   4096MB DDR-II 66
...
```

A 5th column for serial number ("SERIAL") has been truncated in the above example, as has the length of this list.

Component Properties

If a particular component is selected, detailed information about its properties are reported. The following properties are supported, with the corresponding BUI property name. For a description of a particular property, see the description above.

CLI Property	BUI Property
build	Build
cores	Cores
device	N/A
faulted	(status indicator)
label	Label
locate (writable)	(status indicator)
manufacturer	Manufacturer
model	Model
offline (writeable)	(status indicator)
part	Part
present	(status indicator)
revision	Revision
serial	Serial
size	Size
speed	Speed
type	(combined with use)
use	Type

When viewing a disk that is active as a hot spare, the `detach` command is also available.

Viewing CPU details

For example, the following shows details for component "CPU 0":

```
tarpon:maintenance hardware> select chassis-000
tarpon:maintenance chassis-000> select cpu
tarpon:maintenance chassis-000 cpu> select cpu-000
```

```
tarpon:maintenance chassis-000 cpu-000> show
Properties:
                         label = CPU 0
                       present = true
                       faulted = false
                  manufacturer = AMD
                         model = Quad-Core AMD Opteron(tm) Processor 8356
                          part = 1002
                      revision = 03
                         cores = 4
                         speed = 2.14G
```

Tasks

BUI

▼ Locating a failed component

1. **Go to the Maintenance > Hardware screen.**
2. **Click the icon on the Storage System or Disk Shelf which has the fault icon.**
3. **Locate the fault icon in the lists of hardware components, and click it. The image should be updated to show where that component is physically located.**
4. **Optionally, click the icon for that component, if the component has it. The LED on the component will begin to flash.**

CLI

To turn on the locate LED using the CLI, run the following commands.

Go to the maintenance hardware context:

```
knife:> maintenance hardware
```

List the appliance components:

```
knife:maintenance hardware> list
            NAME        STATE            MODEL             SERIAL
chassis-000  knife       ok          Sun Storage 7410  unknown
chassis-001  000000000C  faulted     J4400             000000000C
```

Select the chassis and list its components:

```
knife:maintenance hardware> select chassis-001
knife:maintenance chassis-001> list
                        disk
                         fan
                         psu
                        slot
```

Select the component type and show all available disks:

```
knife:maintenance chassis-001> select disk
knife:maintenance chassis-001 disk> show
Disks:

         LABEL   STATE     MANUFACTURER  MODEL             SERIAL
disk-000  HDD 0   ok          ST3500630NS   ST3500630NS       9QG1ACNJ
disk-001  HDD 1   faulted   ST3500630NS   ST3500630NS       9QG1A77R
disk-002  HDD 2   ok          ST3500630NS   ST3500630NS       9QG1AC3Z
disk-003  HDD 3   ok          ST3500630NS   ST3500630NS       9QG1ACKW
disk-004  HDD 4   ok          ST3500630NS   ST3500630NS       9QG1ACKF
disk-005  HDD 5   ok          ST3500630NS   ST3500630NS       9QG1ACPM
disk-006  HDD 6   ok          ST3500630NS   ST3500630NS       9QG1ACRR
disk-007  HDD 7   ok          ST3500630NS   ST3500630NS       9QG1ACGD
disk-008  HDD 8   ok          ST3500630NS   ST3500630NS       9QG1ACG4
disk-009  HDD 9   ok          ST3500630NS   ST3500630NS       9QG1ABDZ
disk-010  HDD 10  ok          ST3500630NS   ST3500630NS       9QG1A769
disk-011  HDD 11   ok          ST3500630NS   ST3500630NS       9QG1AC27
disk-012  HDD 12  ok          ST3500630NS   ST3500630NS       9QG1AC41
disk-013  HDD 13  ok          ST3500630NS   ST3500630NS       9QG1ACQ5
disk-014  HDD 14  ok          ST3500630NS   ST3500630NS       9QG1ACKA
disk-015  HDD 15  ok          ST3500630NS   ST3500630NS       9QG1AC5Y
disk-016  HDD 16  ok          ST3500630NS   ST3500630NS       9QG1ACQ2
disk-017  HDD 17  ok          ST3500630NS   ST3500630NS       9QG1A76S
disk-018  HDD 18  ok          ST3500630NS   ST3500630NS       9QG1ACDY
disk-019  HDD 19  ok          ST3500630NS   ST3500630NS       9QG1AC3Y
disk-020  HDD 20  ok          ST3500630NS   ST3500630NS       9QG1ACG6
disk-021  HDD 21  ok          ST3500630NS   ST3500630NS       9QG1AC3X
disk-022  HDD 22  ok          ST3500630NS   ST3500630NS       9QG1ACHL
disk-023  HDD 23  ok          ST3500630NS   ST3500630NS       9QG1ABLW
```

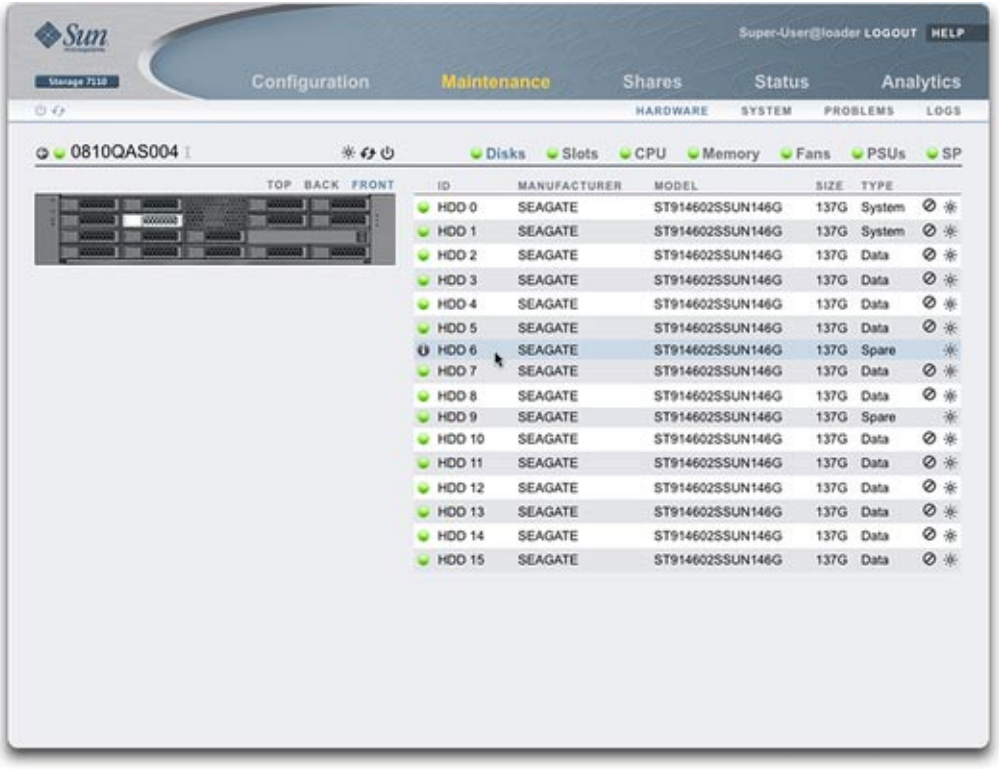
Select the faulted disk and turn on the locate LED:

```
knife:maintenance chassis-001 disk> select disk-001
knife:maintenance chassis-001 disk-001> set locate=true
                      locate = true (uncommitted)
knife:maintenance chassis-001 disk-001> commit
```

◆ ◆ ◆ CHAPTER 2

Hardware Maintenance

Maintenance



Introduction

This section describes concepts and procedural instructions for performing hardware and software maintenance tasks. The graphic above illustrates locating a spare disk within the chassis by highlighting its name in the BUI Hardware Maintenance list.The Maintenance > Hardware screen of the BUI provides visual representations of the physical system components, allowing you to visually identify and locate hardware components and verify their status. Software Updates can be applied in the System section of the interface, as well as viewing Logs and current Problems.

- Hardware - identify hardware components and verify their status
- 7110 Hardware Overview - view component diagrams and specifications
- 7210 Hardware Overview - view component diagrams and specifications
- 7310 Hardware Overview - view component diagrams, specifications, and cluster options
- 7410 Hardware Overview - view component diagrams, specifications, and cluster options
- 7110, 7210, 7310, 7410 Maintenance Procedures - replace controller drives, fans, power supplies, RAM, cards, risers, and batteries
- Disk Shelf Overview - view component diagrams and specifications
- Disk Shelf Maintenance Procedures - replace disk shelf components
- System - view system disks, manage support bundles
- Updates - manage appliance software updates
- Configuration Backup - backup and restore appliance configuration
- Problems - view current problems
- Logs - view appliance logs
- Workflows - manage and execute workflows

7110

Hardware Overview

Use the information in this section as a preparation reference for servicing replaceable components of the 7110 system.

Refer to the following for procedural instructions:

- Controller Tasks - replace system controller components
- Disk Shelf Tasks - replace disk shelf components

7110 Chassis Overview

The Sun Storage 7110 Unified Storage System is a rackmount x64 system powered by an AMD Opteron processor. It packs high performance and room for growth with 6 PCIe slots and 16DIMM slots into a compact 2-RU footprint.

The 7110 is a unique product because it is self-contained. That is, the storage as well as the processing function is contained within the server chassis itself. Refer to the http://www.sun.com/storage/disk_systems/unified_storage/7110/specs.xml (`http://www.sun.com/storage/disk_systems/unified_storage/7110/specs.xml`) for the most recent component specification.

The supported configuration consists of either 16 internal 146GB 10K 2.5" SAS disk drives with a total of 2TB or 16 internal 300GB 10K 2.5" SAS disk drives with a total of 4.2TB. Two drives (disk # 0 & 1) will be used for the OS in a RAID 1 (mirror) and the remaining 14 drives are available for storage.

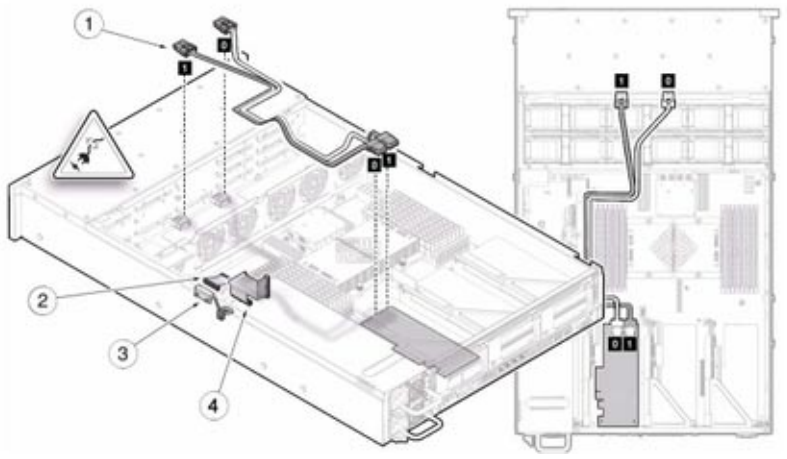
The chassis has the following boards installed. Field-replaceable units (FRU) should only be replaced by trained Sun service technicians.

7110 Boards

- **`PCIe Risers`** - Each riser supports two PCIe cards that are customer-replaceable. There are three risers per system, each attached to the rear of the motherboard.
- **`Motherboard`** - The motherboard is a FRU and includes CPU modules, slots for 16 DIMMs, memory control subsystems, and the service processor (SP) subsystem. The SP subsystem controls the host power and monitors host system events (power and environmental). The SP controller draws power from the hostâs 3.3V standby supply rail, which is available whenever the system is receiving AC input power, even when the system is turned off.
- **`Power Distribution Board`** - The power distribution board is a FRU and distributes main 12V power from the power supplies to the rest of the storage controller. It is directly connected to the paddle card, and to the motherboard through a bus bar and ribbon cable. It also supports a top cover interlock *kill* switch. The power supplies connect directly to the power distribution board.
- **`Paddle Card`** - The vertical power distribution board, or Paddle Card is FRU and serves as the interconnect between the power distribution board and the fan power boards, hard drive backplane, and I/O board.
- **`Fan Power Boards`** - The two fan power boards are FRUs and carry power to the system fan modules. In addition, they contain fan module status LEDs and transfer I2C data for the fan modules.
- **`Hard Drive Backplane`** - The hard drive backplane is a FRU and includes the connectors for the hard disk drives, as well as the interconnect for the I/O board, Power and Locator buttons, and system/component status LEDs. The system has a 16-disk backplane. Each drive has an LED indicator for Power/Activity, Fault, and Identify.

7110 Cables

The storage controller's internal cables are shown in the following figure and table.



Cable	Connection
1 Hard Drive Data Cables (2)	Connections are between the HBA PCI-Express Card and the hard drive backplane.
2 Motherboard to Power Distribution Board Cable	Connection is between the power distribution board and the motherboard.
3 PSU Backplane Cable	To the power supply units
4 Top Cover Interlock	Connected to the power distribution board.

The 2U chassis form factor dimensions are as follows:

Dimension	Measurement
Height	87.85 mm/3.46 in
Width	445.71 mm/17.55 in (includes rack ears; chassis is 425.46mm/16.75 in)
Depth	733.65 mm/28.88 in (includes PSU handle; the chassis is 711.25mm/28.00 in)
Weight	Maximum: 25.6 kg/56.3 lb

7110 I/O Components

The I/O components of the 7110 system are shown in the following figure and table.

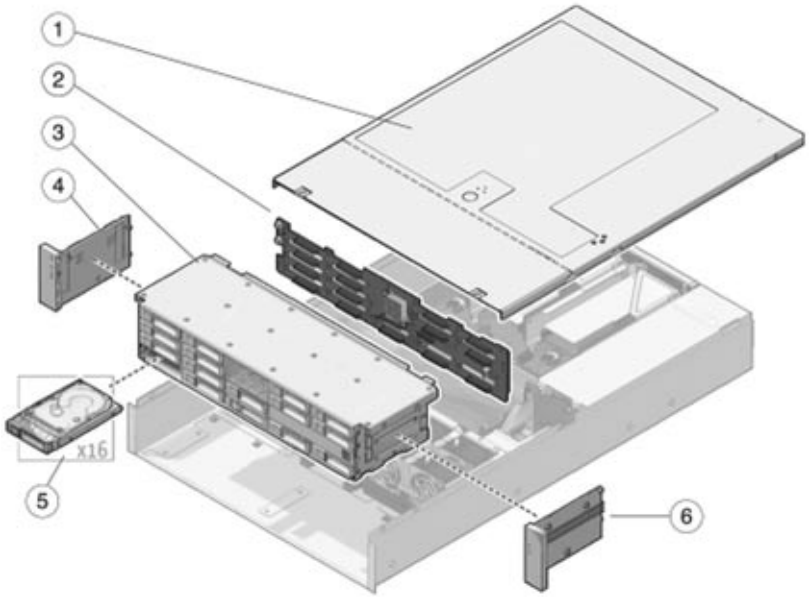
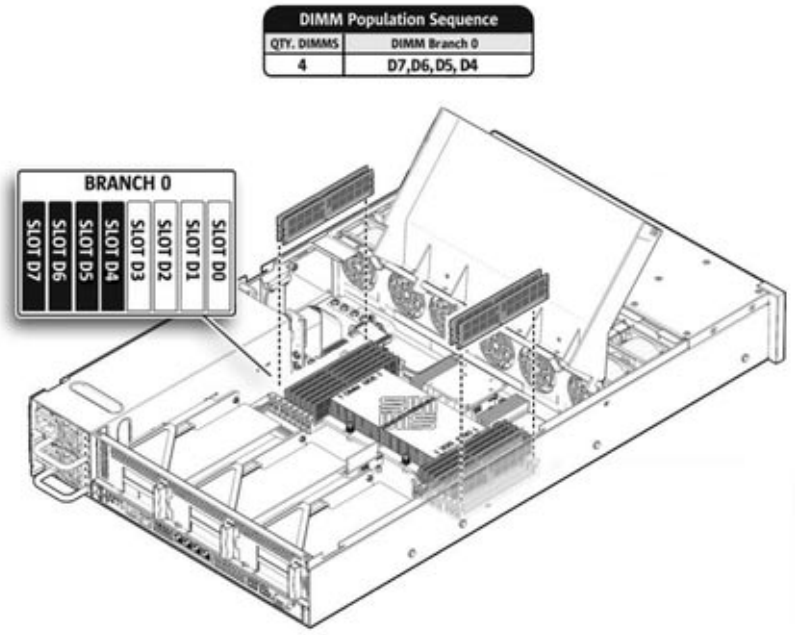


Figure Legend	
1 Top Cover	**4** Left Control Panel Light Pipe Assembly (2)
2 Hard Disk Backplane	**5** Hard Disk Drives
3 Hard Disk Cage	**6** Left Control Panel Light Pipe Assembly

7110 CPU and Memory Components

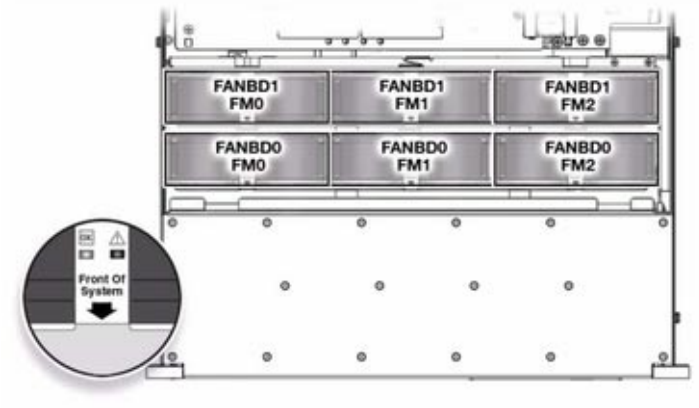
The 7110 motherboard has 16 slots in two groups that hold industry-standard DDR2 DIMM memory cards. The 7110 CPU and memory cards should only be replaced by field service professionals. All sockets must be occupied by either a filler or a DDR2 DIMM. All DDR2 DIMMs must be the same *density*, (type and capacity). The Sun Storage 7110 Unified Storage System supports the 4x2GB DDR2 DIMMs configuration. At minimum, Branch 0, Slot D6, and

Slot D7 must be fully populated with DDR2 DIMMs of the same density.



7110 Power Distribution, Fan Module and Disk Components

The Power Distribution/Fan Module components are as follows.



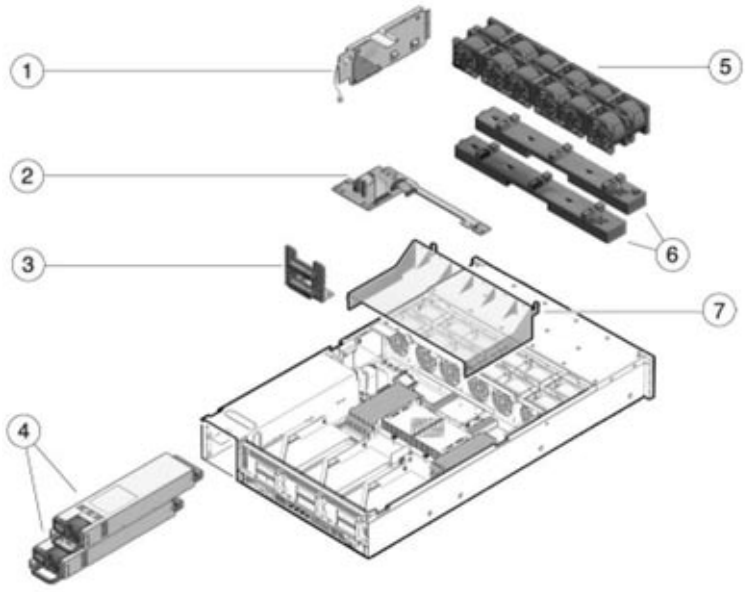
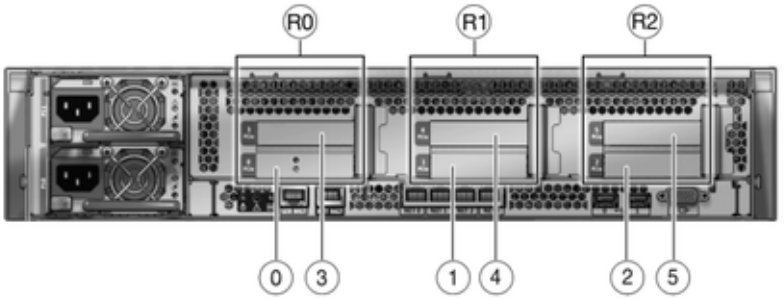


Figure Legend	
1 Paddle Card	**4** Power Supplies
2 Power distribution board/bus bar assembly	**5** Fan Modules
3 Paddle Card	**7** Air Baffle
6 Fan Boards	

7110 PCIe Cards and Risers

Following is the set of guidelines for the 7110 risers. Note that internal HBA XATO 596-7055-01/371/3255/02 is located in slot 0.



Riser/Slot Numbers	Electrical	Mechanical	Source
Riser 0 - Slot 0 (internal SAS HBA)	x8	x8	MCP55
Riser 0 - Slot 3	x8	x8	MCP55
Riser 1 - Slot 1	x8	x8	MCP55
Riser 1 - Slot 4	x8	x8	IO55
Riser 2 - Slot 2	x16	x16	IO55
Riser 2 - Slot 5	x4	x8	IO55

7110 Rear Panel

The following figure shows the rear panel. Note that optional Sun Dual Port 40Gb/sec 4x Infiniband QDR HCAdapter PCIe cards (375-3606-01) may be located in slots 1, 2, or 3. Note that 375-3606-01 HCA expansion cards are not supported in the 10Gb network configurations.

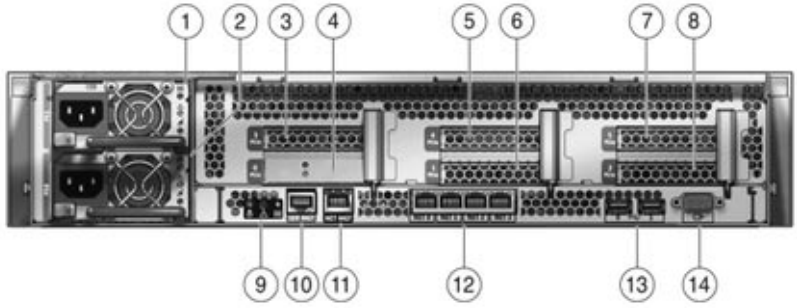


Figure Legend	
1 PSU 1	**9** Rear panel System Status LEDs (locator:white; service action required:amber; power/OK:green)
2 PSU 0	**10** Serial Management Port
3 PCIe 3	**11** Network Management Port
4 PCIe 0 (Occupied with internal SAS HBA)	**5** PCIe 4
6 PCIe 1	**12** Gbit Ethernet Ports (0, 1, 2, 3)
7 PCIe 5	**13** USB Ports (0, 1)
8 PCIe 2	**14** HD15 Video Port

7110 Connector Pinouts

The serial management connector (SERIAL MGT) is an RJ-45 connector and provides a terminal connection to the SP console.

The network management connector (NET MGT) is an RJ-45 connector on the motherboard and provides an alternate terminal interface to the SP console.

There are four RJ-45 Gigabit Ethernet connectors (NET0, NET1, NET2, NET3) located on the motherboard that operate at 10/100/1000 Mbit/sec. These network interfaces must be configured before use.

7110 Front Panel

The following figure shows the front panel.

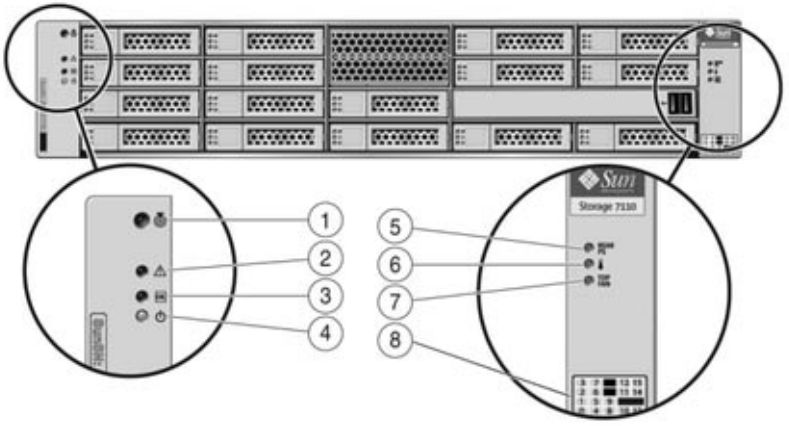
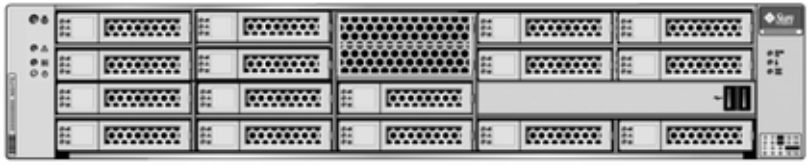


Figure Legend	
1 Locator LED/Locator button (white)	**5** Power Supply Service Required LED (amber)
2 Service Action Required LED (amber)	**6** System Overtemperature LED (amber)
3 power/OK LED (green)	**7** Fan Module Service Required LED (amber)
4 Power button	**8** Hard Disk Drive map

7110 Drive Locations

The following figure shows the drive locations.



Physical Hard Disk Drive Locations				
HDD3	HDD7	N/A	HDD12	HDD15
HDD2	HDD6	N/A	HDD11	HDD14
HDD1	HDD5	HDD9	N/A	N/A
HDD0	HDD4	HDD8	HDD10	HDD13

7110 Configurations

The following table shows the configuration options for a single controller 7110. All PCIe cards are low-profile, and must be fitted with low-profile mounting brackets. Note that 10Gb Ethernet NIC cards **must not** be combined with 1Gb Ethernet NIC cards in the same system.

This table describes single base configurations for 7110.

Sun Mktg Part Number	Description	Mfg Part Number
TB7110-16ASA20	S7110, 1xCPU, 8GB, 2TB	597-0648-01
TB7110-16ASA42	S7110, 1xCPU, 8GB, 4.	597-0649-01

This table describes NIC HBA options for 7110.

Sun Mktg Part Number	Description	Mfg Part Number
SG-XPCIE2FC-QF4	2-port FC HBA, 4Gb, PCIe	594-2018-02
SG-XPCIE2FC-QF8-Z	2-port FC HBA, 8Gb, PCIe	594-5684-01
SGXPCIE2SCSIU320Z	2-port SCSI HBA, PCIe	594-2019-04
X7280A-2	2-port 10/100/1000 NIC, PCIe	594-1755-04
X7281A-2	2-port MMF (Optical) NIC, PCIe	594-1756-03

Sun Mktg Part Number	Description	Mfg Part Number
X4446A-Z	4-port PCIe Quad GigE UTP	594-4024-01
X4237A	2-port 4X IB HCA PCIe	594-4110-03
X1027A-Z	2-port 10Gig NIC, PCIe	594-4110-03

This table describes the supported PCIe configuration option summary for 7110 (without 10GigE cards).

Slot	Slot Type	Sun Part Number	Vendor Part Number	Description	Note
0	PCIe	371-3255-03	LSI 1068E	Internal SAS HBA	Base Configuration
1	N/A	N/A	N/A	N/A	Not Used
2	PCIe	371-0905-04	Intel EXPI9402PT	DP Copper NIC	Optional Allowed Alternative
2	PCIe	371-0904-03	Intel EXPI9402PF	DP Optical NIC	Optional Allowed Alternative
2	PCIe	375-3481-01	Intel EXPI9404PT	QP Copper NIC	Optional Recommended Front-end
2	PCIe	375-3606-02	Sun Dual Port 40Gb/sec 4x	Infiniband HCA	Optional Recommended Front-end
2	PCIe	371-4325-01	QLogic	8Gb DP FC HBA	Optional FC Target or Initiator (Backup)
3	PCIe	371-0905-04	Intel EXPI9402PT	DP Copper NIC	Optional Allowed Alternative
3	PCIe	371-0904-03	Intel EXPI9402PF	DP Optical NIC	Optional Allowed Alternative
3	PCIe	375-3481-01	Intel EXPI9404PT	QP Copper NIC	Additional Optional Recommended Front-
3	PCIe	375-3606-02	Sun Dual Port 40Gb/sec 4x	Infiniband QDR	Optional Recommended Front-end
3	PCIe	371-4325-01	QLogic	8Gb DP FC HBA	Optional FC Target or Initiator (Backup)
4	PCIe	371-0905-04	Intel EXPI9402PT	DP Copper NIC	Optional Allowed Alternative
4	PCIe	371-0904-03	Intel EXPI9402PF	DP Optical NIC	Optional Allowed Alternative
4	PCIe	375-3481-01	Intel EXPI9404PT	QP Copper NIC	Optional Recommended Front-end
4	PCIe	375-3606-02	Sun Dual Port 40Gb/sec 4x	Infiniband QDR	Optional Recommended Front-end
4	PCIe	371-4325-01	QLogic	8Gb DP FC HBA	Optional FC Target or Initiator (Backup)
5	PCIe	375-3357-05	LSI LSI22320SLE	DP SCSI HBA	Optional (Tape BU)

This table describes the supported PCIe configuration option summary for 7110 (with 10GigE cards).

Slot	Slot Type	Sun Part Number	Vendor Part Number	Description	Note
0	PCIe	371-3255-03	LSI 1068E	Internal SAS HBA	Base Configuration
1	N/A	N/A	N/A	N/A	Not used
2	PCIe	501-7283-07	Sun	DP Optical 10GE NIC	Additional Optional Recommended Fro
3	PCIe	501-7283-07	Sun	DP Optical 10GE NIC	Additional Optional Recommended Fro
4	N/A	N/A	N/A	N/A	Not used
5	PCIe	375-3356-02	QLogic QLE2462L	DP 4Gb FC HBA	Optional (Tape BU)
5	PCIe	375-3357-05	LSI LSI22320SLE	DP SCSI HBA	Optional (Tape BU)

See Also

- Controller Details

7210

Hardware Overview

Use the information on this page as a preparation reference for servicing replaceable components of the 7210 system. Refer to the following for procedural instructions:

- Controller Tasks - replace system controller components
- Disk Shelf Tasks - replace disk shelf components

7210 Chassis Overview

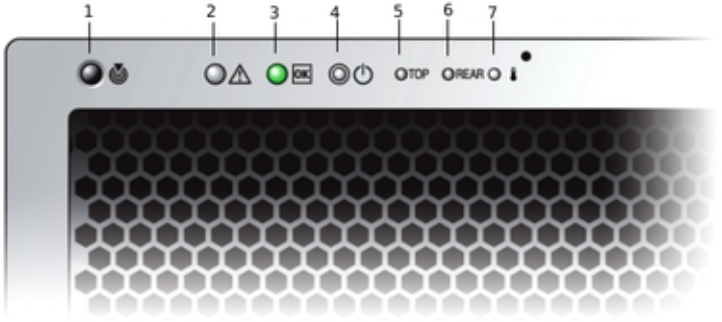
The Sun Storage 7210 Unified Storage System provides the following maximum configurations:

- Sixteen DDR2 DIMM slots (8 per processor) 64GB maximum with two CPUs and 4GB DIMMs, standard 32GB
- Up to forty-eight 3.5-inch SATA-II drives of 250GB - 1TB capacity (48TB total system capacity)
- Three x8 PCIe slots
- Up to two Solid State Drives 18GB 3.5" SATA

Refer to the http://www.sun.com/storage/disk_systems/unified_storage/7210/specs.xml (`http://www.sun.com/storage/disk_systems/unified_storage/7210/specs.xml`) for the most recent component specification.

7210 Front Panel

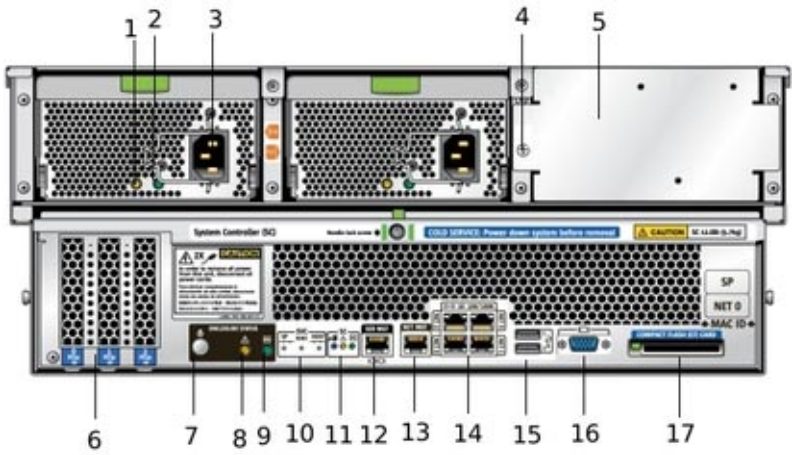
The following figures show the front panel and controls.



#	Name	Description
1	Locate button/LED	Remote On. Press to turn off.
2	System Fault	When on, service action is required
3	Power Operation	Steady: On, Blink:Standby; Off: Power is off
4	System power button	Automated power on by default
5	Top failure LED	On - HDD or fan fault
6	Rear failure LED	On - Power supply or system controller fault (service required)
7	Over Temperature LED	When on, the system is over temperature.

7210 Rear Panel

The following figure shows the rear panel.

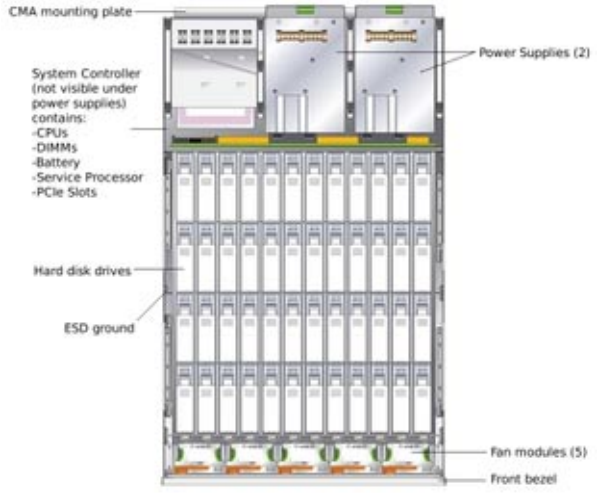


#	Name	Description
1	Power Supply Fault LED (amber)	On: service action required
2	Power Supply LED (green)	Steady: AC/DC power OK; Blinking: AC Standby power on; Off: Power is off
3	AC power connectors	Each power supply has its own AC connector with a clip to secure its cable
4	Chassis ground	Connect grounding straps
5	Mounting plate	To secure Cable Management Arm (CMA) - optional
6	PCIe	Three slots for PCIe cards
7	Locate button/LED (white)	Remote On, press to turn off
8	Fault LED	Amber: service action required
9	OK LED	Green: power is on; Off: system power is off; Blink: power connected but host system is off
10	Reset buttons	Only use when directed by Sun service personnel
11	System controller status LEDs	Blue:service action allowed; Amber:faulted, action required; Green: operational
12	Serial management port	Serial connection to service processor
13	Network management port	10/100 Mbit/sec Ethernet connection to service processor
14	Gigabit (10/100/1000 Mbit/sec) Ethernet ports	To connect system to Ethernet

#	Name	Description
15	USB connectors	Not supported
16	Video connector	Not supported
17	Compact Flash (CF) card	Not supported

7210 System Components

The following figure shows the system components.



7210 Additional Options and Replaceable Components

Following are the after-factory options and replaceable components of the 7210 system.

Component	Mktg Part Number	FRU/CRU
Power Supply (2 PS/system)	#300-1787	CRU
Fan Module (5 fan modules/system)	#341-0458	CRU
Seagate Galaxy 250GB	#541-1468	CRU
Hitachi GeminiK 500GB	#541-3050	CRU
Hitachi GeminiK 1TB	#540-7507	CRU
Seagate 250GB ST3250310NS	#541-3678	CRU

Component	Mktg Part Number	FRU/CRU
Seagate 500GB ST3500320NS	#541-3679	CRU
Seagate 1TB ST31000340NS	#541-3730	CRU
2 DIMMs x 2GB DIMMS (4GB total) Registered ECC Memory, 16 slots/system	#541-1313 X5034 (X-Option)	CRU
2 DIMMs x 4GB DIMMS (8GB total) Registered ECC Memory, 16 slots/system	#541-1304 X5035 (X-Option)	CRU
System Controller Assembly (I/O controller and CPU boards)	#541-0491 - without CPUs	FRU
CPU (quad core 2356 processor)	#371-4042	FRU
Sun Dual Port 40Gb/sec 4x Infiniband QDR HCA, PCIe	#375-3606-01	FRU
QLogic 8Gb DP FC HBA	#371-4325-01	FRU
Front Indicator Board (FIB) with ribbon cable	#501-7192	FRU
System Enclosure Super (disk backplane and FIB with ribbon cable)	#541-1907-01	FRU
Power Distribution Board	#501-7104	FRU
Cable Management Arm	#371-2887-01	CRU
Slide Rail Kit	#371-3493-01	CRU
Solid State Drive 18 GB 3.5" SATA	#540-7350-01	CRU

As an option, the 7210 offers expanded storage up to 144 TB using a maximum of two J4500 disk shelves via an external SAS HBA card, Sun part # 594-4098-04 (PTO), 596-6707-04 (ATO) and 4X Mini SAS Shielded Cables.

See Also

For step-by-step information about how to replace components refer to the following sections:

- Controller Details
- Disk Shelf Details

7310

Hardware Overview

Use the information in this section as a preparation and reference for servicing replaceable components of the 7310 system. Refer to the following for procedural instructions:

- Controller Tasks - replace storage controller components
- Disk Shelf Tasks - replace disk shelf components

7310 Chassis Overview

The Sun Storage 7310 Unified Storage System consists of either a single storage controller, or two storage controllers in a high availability cluster configuration, and one to four Sun disk shelves.

The 7310 controller base configuration includes one CPU, built-in 4 x 1Gb/s Front-end GigE ports, redundant power supplies, NIC Card options for expanded front-end support, tape backup, and Dual Port SAS HBA for the backend.

The CPU is an AMD Opteron Six-core 2427 2.2GHz processor. Systems can be upgraded with second Six-core 2427 2.2GHz processor. Standard Memory configuration is16GB, 4 x 4GB DDR2-667 SR DIMMs and may be upgraded to 64GB using 16x4GB DDR2-667 DIMMs. The Clustered configuration simply uses two servers and a Cluster Card in each server for a heartbeat connection between them.

All user accessible storage is provided by one to four J4400/Sun Disk shelves external to the server(s). The RAID function is done by the software. Solid State 18GB 3.5" SATA drives (7310 SAS-1) and 18GB SAS-1 drives (7310 SAS-2) which are used for high performance write cache known as LogZilla or ZFS intent log (ZIL) devices, are in place of one to four of the 24 drives in the Disk Shelf, the remaining 20 drives are available for storage.

Refer to the http://www.sun.com/storage/disk_systems/unified_storage/7310/specs.xml (`http://www.sun.com/storage/disk_systems/unified_storage/7310/specs.xml`) for the most recent component specification.

7310 SAS-1

The Sun Storage 7310 SAS-1 appliance provides external storage, including expansion, using J4400 storage enclosures. These enclosures support the SAS-1 protocol and are populated with 1TB 7200 RPM SATA disks. They are connected to the controller(s) via the SAS-1 LSI HBA.

7310 SAS-2

The 7310 SAS-2 (Serial Attached SCSI 2.0) moves to a next generation architecture that consists of a new HBA, new disk shelf, and new disks (1TB and 2TB SAS-2). The SAS-2 storage fabric supports greater number of targets, greater bandwidth, higher reliability and bigger scale.

7310 Boards

The storage controller chassis has the following boards installed. Field-replaceable units (FRUs) should only be replaced by trained Sun service technicians.

- **`PCIe Risers`** - The storage controller contains three PCIe risers that are customer-replaceable units (CRUs) and are attached to the rear of the motherboard. Each riser supports one PCIe card.
- **`Motherboard`** - The motherboard is a FRU and includes CPU modules, slots for 16 DIMMs, memory control subsystems, and the service processor (SP) subsystem. The SP subsystem controls the host power and monitors host system events (power and environmental). The SP controller draws power from the hostâs 3.3V standby supply rail, which is available whenever the system is receiving AC input power, even when the system is turned off.
- **`Power Distribution Board`** - The power distribution board is a FRU and distributes main 12V power from the power supplies to the rest of the storage controller. It is directly connected to the Vertical PDB card, and to the motherboard through a bus bar and ribbon cable. It also supports a top cover interlock *kill* switch. In the storage controller, the power supplies connect to the power supply backplane which connects to the power distribution board.
- **`Paddle Card`** - The vertical power distribution board, or Paddle Card is a FRU and serves as the interconnect between the power distribution board and the fan power boards, hard drive backplane, and I/O board.
- **`Fan Boards`** - The two fan boards are FRUs and carry power to the storage controller fan modules. In addition, they contain fan module status LEDs and transfer I2C data for the fan modules.
- **`Hard Drive Backplane`** - The hard drive backplane is a FRU and includes the connectors for the hard disk drives, as well as the interconnect for the I/O board, Power and Locator buttons, and system/component status LEDs. The storage controller has an eight-disk backplane. Each drive has an LED indicator for Power/Activity, Fault, and OK-to-remove (not supported).

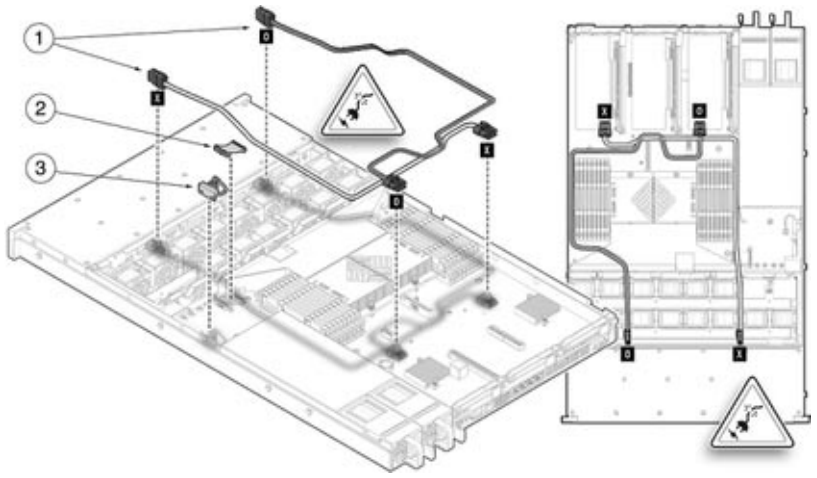
Following is the complete set of replaceable system boards for the 7310 storage controller.

Part Number	Description	FRU/CRU
F541-2128-04	X8-XAUI PCIe Riser Card 1U	CRU
F541-2298-02	X16 SWIZ PCIe Riser Card 1U	CRU

Part Number	Description	FRU/CRU
F541-2297-08	RoHS Galaxy 2N Motherboard and Tray	FRU
F501-7696-09	DB, Power Distribution Board	FRU
F501-7797-05	PCB, 8 Disk 1U Backplane	FRU
F541-2183-05	PCBA, Connector Board, 1U	FRU

7310 Cables

The storage controller's internal cables are shown in the following figure and described in the table.



Cable	Connection
1 SATA Hard Drive Data Cables	Connections are between the motherboard SATA connections and the hard disk backplane. Note that the X Connector must be placed before the 0 Connector.
2 Motherboard to Power Distribution Board Cable	Connection is between the power distribution board and the motherboard.
3 Top Cover Interlock	Connected to the power distribution board.

Following is the complete set of replaceable cables for the 7310 storage controller.

Part Number	Description	FRU/CRU
F540-7609-01	Cable, Mini SAS/SATA RT G1N2 2U	FRU (internal)
F530-3927-01	FRU,CBL,PDB,MB,1U+2U,RIBBON	FRU (internal)

Part Number	Description	FRU/CRU
F530-3880-01	Cable, Assembly, Ethernet, Shielded, RJ45-RJ45, 6m	CRU (external)
F530-3883-01	FRU,2M,4X MINI SAS CBL,SHLD	CRU (external)

7310 I/O Components

The I/O components of the storage controller are shown in the following figure and identified in the table.

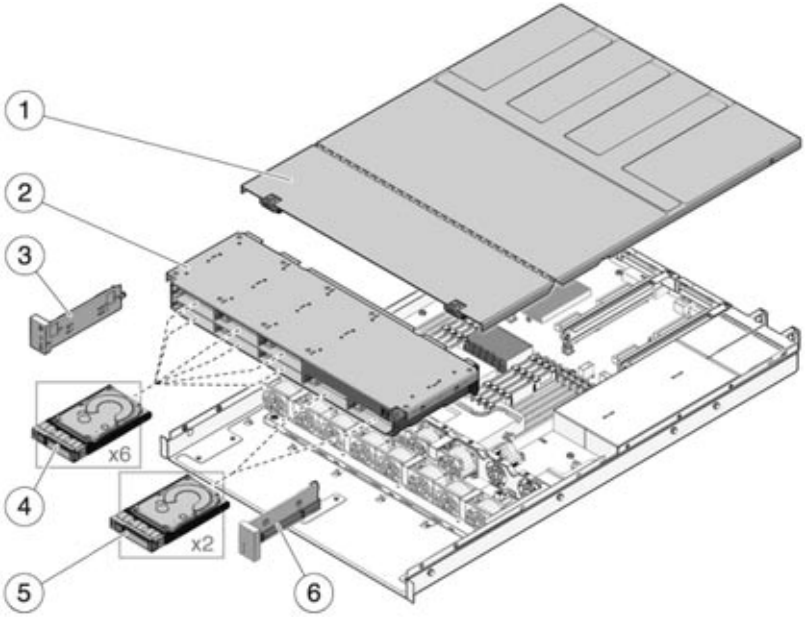


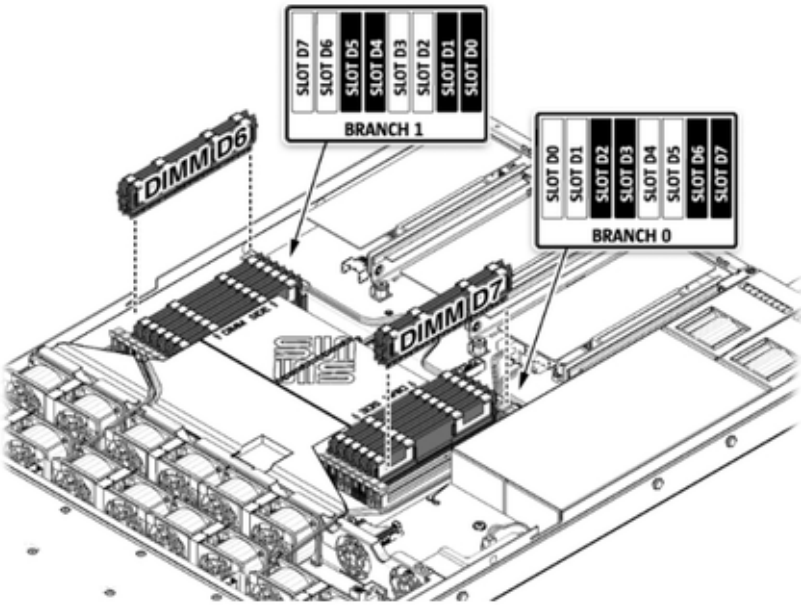
Figure Legend	
1 Top Cover	**4** Solid State Drives
2 Hard Disk Cage	**5** Hard Disk Drives
3 Left Control Panel Light Pipe Assembly	**6** Right Control Panel Light Pipe Assembly

7310 CPU and Memory Components

Following are the replaceable CPU and memory components of the 7310 system.

Part Number	Description	FRU/CRU
F540-7600-01	RoHS Memory 2 x 4GB (371-3847-01)	CRU
F371-4042-01	AMD, Opteron 2356 Quad-core 2.3GHz	FRU

The storage controller motherboard has 16 slots in two groups that hold industry-standard DDR2 DIMM memory cards. All sockets must be occupied by either a filler or a DDR2 DIMM.



Branch Number	Channel Number	Address	Motherboard Connector
Group 0	Channel A	/SYS/Memory/DIMM_A0	J1001
		/SYS/Memory/DIMM_A1	J1101
		/SYS/Memory/DIMM_A2	J1101
		/SYS/Memory/DIMM_A3	J1101
	Channel B	/SYS/Memory/DIMM_B0	J1201
		/SYS/Memory/DIMM_B1	J1301
		/SYS/Memory/DIMM_B2	J1301
		/SYS/Memory/DIMM_B3	J1301

Branch Number	Channel Number	Address	Motherboard Connector
Group 1	Channel C	/SYS/Memory/DIMM_C0	J1001
		/SYS/Memory/DIMM_C1	J1101
		/SYS/Memory/DIMM_C2	J1101
		/SYS/Memory/DIMM_C3	J1101
	Channel D	/SYS/Memory/DIMM_D0	J1201
		/SYS/Memory/DIMM_D1	J1301
		/SYS/Memory/DIMM_D2	J1301
		/SYS/Memory/DIMM_D3	J1301

7310 Power Distribution, Fan Module and Disk Components

The Power Distribution/Fan Module components of the storage controller are shown in the following figure and identified in the table.

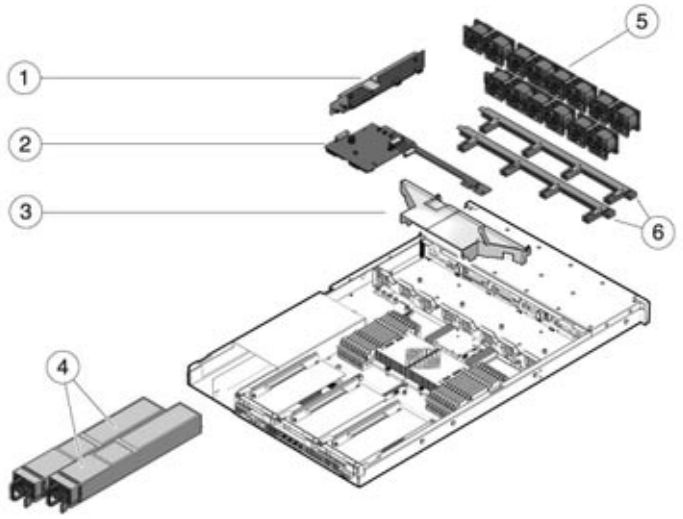


Figure Legend	
1 Power Distribution Board/Bus Bar Assembly	**4** Power Supplies

Figure Legend	
2 Paddle Card	**5** Fan Modules
3 Air Baffle	**6** Fan Boards

7310 Drive Locations

Two mirrored hard disk drives (HDDs) that store the operating system reside in slots 6 and 7. Up to six solid state drives (ReadZilla SSDs) that store the read cache fill slots 0 through 5, in order.

Following is the complete list of replaceable power distribution, disk, and fan module components of the 7310 system. Note that power supplies, disks, and fan modules are hot-pluggable on the storage controller.

Part Number	Description	FRU/CRU
F300-2015-05	RoHS 650W Power Supply	CRU
F540-7711-01	2.5" 500GB 5400rpm SATA HDD	CRU
F540-7793-01	2.5" 100GB ReadZilla SSD	CRU
F541-2802-03	FAN CPU,1U J+	CRU
F541-2112-03	Fan Board (1U)	FRU

7310 SAS-1 PCIe Cards and Risers

Following is the complete list of replaceable PCIe cards for the 7310 SAS-1 system.

Part Number	Description	FRU/CRU
F375-3356-02	Fibre Channel (PCIe)	CRU
F371-4325-01	Dual Port 8Gb FC HBA (PCIe)	CRU
F375-3487-05	Dual Port SAS (x4) HBA (PCIe)	CRU
F371-0905-04	NIC Card Dual Port 1GigE Cu (PCIe)	CRU

Part Number	Description	FRU/CRU
F371-0904-03	NIC Card Dual Port 1GigE Fiber (PCIe)	CRU
F375-3481-01	NIC Card Quad Port 1GigE Cu (PCIe)	CRU
F501-7283-07	NIC Card Dual Port 10GigE (PCIe)	CRU
F375-3606-02	InfiniBand HCA	Optional Recommended Front-end
F371-3024-01	Sun Fishworks Cluster Controller 100 (PCIe)	FRU

The PCIe expansion system is configured using two types of riser cards, as follows. Note that PCIe cards with x4, x8, or x16 mechanical finger pins will fit in any riser slot but will operate at the lane width of the slot.

Location: Type	Cards (Single Controller)	Cards (Clustered Controllers)	PCIe Lane Width	Size	Sourc
Slot: 0 Type:1	Optional tape backup HBA	Cluster card	x8	x8	MCI
Slot:1 Type:1	SAS HBA	SAS HBA	x8	x8	MCI
Slot:1 Type:2	Optional NIC	Optional NIC or tape backup HBA	x4	x8	IO55

7310 SAS-1 Rear Panel

Following is an illustration of the 7310 SAS-1 storage controller rear panel.

7310 SAS-1 Single and Cluster Controller Configurations

The 7310 SAS-1 single controller base configuration is 16GB RAM, 1x2.3GHz Quad-Core processor, one SAS HBA, and four 10/100/1000 Ethernet ports. Following are the PCIe configuration options for a single controller. All PCIe cards are low-profile, and must be fitted with low-profile mounting brackets. Note that 10Gb Ethernet NIC cards **must not** be combined with 1Gb Ethernet NIC cards in the same system.

Slot	Part Number	Description	Note
0	QLogic QLE2462L	Two-port 4Gb Fibre Channel HBA	Optional tape backup HBA
0	LSI LSI22320SLE	Two-port SCSI HBA	Optional tape backup HBA
1	LSI 3801E	Two-port SASx4 HBA	Storage shelf connector, included in base configuration
2	Intel EXPI9404PT	Four-port 1Gb Copper Ethernet NIC	Optional NIC, recommended
2	Sun 375-3606-01	Dual Port 40Gb/sec 4x Infiniband QDR	Host Channel Adapter PCI Express, RoHS:Y

The 7310 SAS-1 cluster base configuration is 16GB RAM, 1x2.3GHz Quad-Core processor, one SAS HBA, four 10/100/1000 Ethernet ports, and a Cluster card. The Sun Storage 7410C Cluster Upgrade Kit (XOPT 594-4680-01) contains two cluster cards with cables for converting two 7310 or two 7410 controllers to a cluster. The following options are available for 7310 SAS-1 clustered storage controllers. Note that both storage controllers in a cluster must be configured identically with regard to card configurations and all optional NIC/HBA card configurations chosen for clustered storage controllers must be identical in both chassis.

Slot	Part Number	Description	Note
0	Sun 371-3024-01	Sun Fishworks Cluster Controller 100	Cluster card, included in base configuration
1	LSI 3801E	Two-port SASx4 HBA	Storage shelf connector, included in base configuration
2	QLogic QLE2462L	Two-port 4Gb Fibre Channel HBA	Optional tape backup HBA
2	Intel EXPI9404PT	Four-port 1Gb Copper Ethernet NIC	Optional NIC, recommended
2	Sun X1027A-Z	Two-port 10Gb Optical Ethernet NIC	Optional NIC, recommended
2	Intel EXPI9402PT	Two-port 1Gb Copper Ethernet NIC	Optional NIC, allowed alternative
2	Intel EXPI9402PF	Two-port 1Gb Optical Ethernet NIC	Optional NIC, allowed alternative
2	Sun 375-3606-01	Dual Port 40Gb/sec 4x Infiniband QDR	Host Channel Adapter PCI Express, RoHS:Y

7310 SAS-2 PCIe Cards and Risers

Following is the complete list of replaceable PCIe cards for the 7310 SAS-2 system.

Part Number	Description	FRU/CRU
F375-3357-05	Dual U320 SCSI (PCIe)	CRU
F375-3356-02	Dual Port 4Gb FC HBA (PCIe)	CRU
F371-4325-01	Dual Port 8Gb FC HBA (PCIe)	CRU
F375-3487-04	Dual Port SAS (x4) HBA (PCIe)	CRU

Part Number	Description	FRU/CRU
F371-0905-04	NIC Card Dual Port 1GigE Cu (PCIe)	CRU
F371-0904-03	NIC Card Dual Port 1GigE Fiber (PCIe)	CRU
F375-3481-01	NIC Card Quad Port 1GigE Cu (PCIe)	CRU
F501-7283-07	NIC Card Dual Port 10GigE (PCIe)	CRU
F371-3024-01	Sun Fishworks Cluster Controller 100 (PCIe)	FRU

The PCIe expansion system is configured using two types of riser cards, as follows. Note that PCIe cards with x4, x8, or x16 mechanical finger pins will fit in any riser slot but will operate at the lane width of the slot.

Location: Type	Cards (Single Controller)	Cards (Clustered Controllers)	PCIe Lane Width	Size	Source
Slot: 0 Type:1	Optional tape backup HBA	Cluster card	x8	x8	MCP55
Slot:1 Type:1	SAS HBA	SAS HBA	x8	x8	MCP55
Slot:1 Type:2	Optional NIC	Optional NIC or tape backup HBA	x4	x8	IO55

7310 SAS-2 Rear Panel

Following is an illustration of the 7310 SAS-2 storage controller rear panel. The Sun 375-3609 belongs in slot 1 (number 11 in the diagram), cannot be installed in any other slots, and a second is not offered as an option.

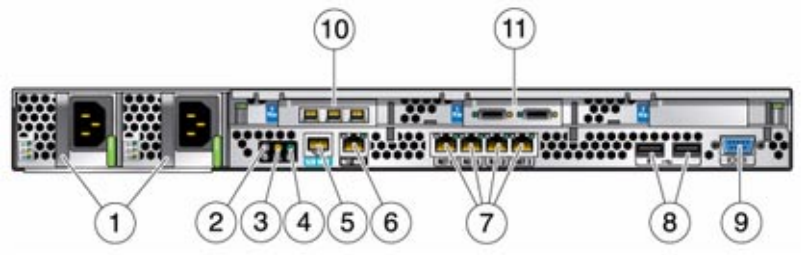


Figure Legend	
1 Power Supplies	**7** Ethernet ports

Figure Legend	
2 Locator LED button	**8** USB ports (not for use)
3 Service Required LED	**9** VGA video port (not for use)
4 Power OK LED	**10** Cluster Card (cluster config. only)
5 Serial management port	**11** HBA
6 Network management port	

7310 SAS-2 Single and Cluster Controller Configurations

The single controller base configuration is 16GB RAM, 1x2.3GHz Quad-Core processor, one SAS HBA, and four 10/100/1000 Ethernet ports. Following are the PCIe configuration options for a single controller. All PCIe cards are low-profile, and must be fitted with low-profile mounting brackets. Note that 10Gb Ethernet NIC cards **must not** be combined with 1Gb Ethernet NIC cards in the same system.

Slot	Part Number	Description	Note
0	QLogic QLE2462L	Two-port 4Gb Fibre Channel HBA	Optional tape backup HBA
0	LSI LSI22320SLE	Two-port SCSI HBA	Optional tape backup HBA
0	Sun 371-4325-01	Two-port FC HBA, 8Gb, PCIe	Optional FC Target or Initiator (Backup)
1	Sun 375-3609	Two-port SASx4 HBA	Storage shelf connector, included in base configuration
2	Intel EXPI9404PT	Four-port 1Gb Copper Ethernet NIC	Optional NIC, recommended
2	Sun 375-3606-01	Dual Port 40Gb/sec 4x Infiniband QDR	Host Channel Adapter PCI Express, RoHS:Y
2	PCIe	371-4325-01	QLogic 8Gb DP FC HBAOptional FC

The 7310 SAS-2 cluster base configuration is 16GB RAM, 1x2.3GHz Quad-Core processor, one SAS HBA, four 10/100/1000 Ethernet ports, and a Cluster card. The Sun Storage 7410C Cluster Upgrade Kit (XOPT 594-4680-01) contains two cluster cards with cables for converting two 7310 or two 7410 controllers to a cluster. The following options are available for clustered storage controllers. Note that both storage controllers in a cluster must be configured identically with regard to card configurations and all optional NIC/HBA card configurations chosen for clustered storage controllers must be identical in both chassis.

Slot	Part Number	Description	Note
0	Sun 371-3024-01	Cluster controller 100	Cluster card, included in base configuration
1	Sun 375-3609	Two-port SASx4 HBA	Storage shelf connector, included in base configuration
2	QLogic QLE2462L	Two-port 4Gb Fibre Channel HBA	Optional tape backup HBA
2	Intel EXPI9404PT	Four-port 1Gb Copper Ethernet NIC	Optional NIC, recommended
2	LSI LSI22320SLE	Two-port SCSI HBA	Optional tape backup HBA
2	Sun X1027A-Z	Two-port 10Gb Optical Ethernet NIC	Optional NIC, recommended
2	Intel EXPI9402PT	Two-port 1Gb Copper Ethernet NIC	Optional NIC, allowed alternative
2	Intel EXPI9402PF	Two-port 1Gb Optical Ethernet NIC	Optional NIC, allowed alternative
2	Sun 375-3606-01	Dual Port 40Gb/sec 4x Infiniband QDR	Host Channel Adapter PCI Express, RoHS:Y
2	371-4325-01	QLogic 8Gb DP FC HBA	Optional FC Target or Initiator (Backup)

7310 Connector Pinouts

The serial management connector (SERIAL MGT) is an RJ-45 connector and a terminal connection to the SP console.

The network management connector (NET MGT) is an RJ-45 connector on the motherboard and provides an alternate terminal interface to the SP console.

There are four RJ-45 Gigabit Ethernet connectors (NET0, NET1, NET2, NET3) located on the motherboard that operate at 10/100/1000 Mbit/sec. These network interfaces must be configured before use.

7310 SAS-1 Storage Disk Shelf

The user-accessible storage for the 7310 system is provided by one to four J4400/Sun disk shelves. Typically a shelf is fully-populated with 24 drives unless only one shelf is used, in which case the shelf may be half-populated with 12 drives. Expanding beyond one shelf requires that all shelves are fully-populated with 24 drives each.

7310 SAS-2 Storage Disk Shelf

The 7310 single and cluster controller configurations allow a single chain of 1 to 4 Sun Disk Shelves. Any combination of disk-only and Logzilla-capable shelves may be combined within the chain in any order. The cabling configurations are unchanged. Half-populated shelf configurations are not supported for SAS-2.

See Also

- Disk Shelf Overview
- Disk Shelf Details
- Controller Details

7410

Hardware Overview

Use the information on this page as a preparation reference for servicing replaceable components of the 7410 system. Refer to the following for procedural instructions:

- Controller Tasks - replace system controller components
- Disk Shelf Tasks - replace disk shelf components

7410 Chassis Overview

The Sun Storage 7410 Unified Storage System consists of either a single storage controller, or two storage controllers in a high availability cluster configuration, and one to twelve Sun disk shelves. Refer to the http://www.sun.com/storage/disk_systems/unified_storage/7410/specs.xml (`http://www.sun.com/storage/disk_systems/unified_storage/7410/specs.xml`) for the most recent component specification.

7410 SAS-1

The Sun Storage 7410 SAS-1 appliance provides external storage, including expansion, using J4400 storage enclosures. These enclosures support the SAS-1 protocol and are populated with 1TB 7200 RPM SATA disks. They are connected to the controller(s) via the SAS-1 LSI HBA.

7410 SAS-2

The 7410 SAS-2 (Serial Attached SCSI 2.0) moves to a next generation architecture that consists of a new HBA, new disk shelf, and new disks (1TB and 2TB SAS-2). The SAS-2 storage fabric supports greater number of targets, greater bandwidth, higher reliability and bigger scale.

7410 Boards

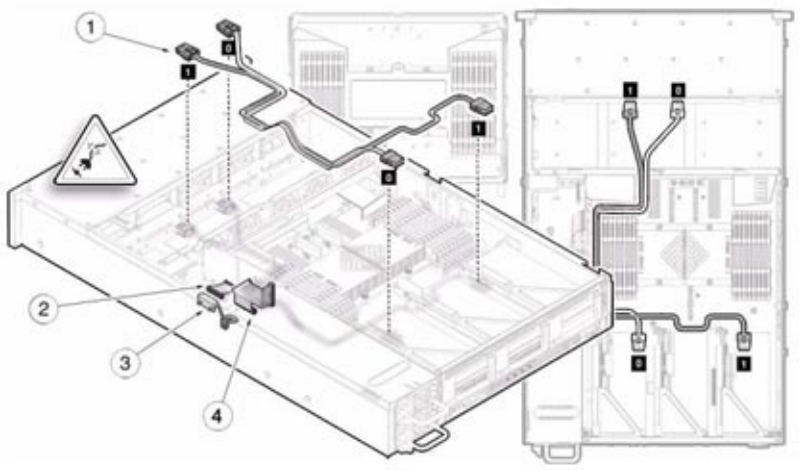
The storage controller chassis has the following boards installed. Field-replaceable units (FRUs) should only be replaced by trained Sun service technicians.

- **PCIe Risers** - The storage controller contains three PCIe risers that are customer-replaceable units (CRUs) and are attached to the rear of the motherboard. Each riser supports two PCIe cards.
- **Motherboard** - The motherboard is a FRU and includes CPU modules, slots for 16 DIMMs, memory control subsystems, and the service processor (SP) subsystem. The SP subsystem controls the host power and monitors host system events (power and environmental). The SP controller draws power from the hostâs 3.3V standby supply rail, which is available whenever the system is receiving AC input power, even when the system is turned off. Hyper-transport connector slots to a mezzanine tray support two additional processors and memory.
- **Mezzanine Tray** - The removable mezzanine tray is a FRU and includes two additional CPU modules, slots for 16 DIMMs, and memory control subsystems.
- **Power Distribution Board** - The power distribution board is a FRU and distributes main 12V power from the power supplies to the rest of the system. It is directly connected to the Vertical PDB card, and to the motherboard through a bus bar and ribbon cable. It also supports a top cover interlock (âkillâ) switch. In the storage controller, the power supplies connect to the power supply backplane which connects to the power distribution board.
- **Vertical PDB Card** - The vertical power distribution board, or Paddle Card is a FRU and serves as the interconnect between the power distribution board and the fan power boards, hard drive backplane, and I/O board.
- **Power Supply Backplane Card** - This board connects the power distribution board to power supplies 0 and 1.
- **Fan Power Boards** - The two fan power boards are FRUs and carry power to the storage controller fan modules. In addition, they contain fan module status LEDs and transfer I2C data for the fan modules.

- **`Hard Drive Backplane`** - The hard drive backplane is a FRU and includes the connectors for the hard disk drives, as well as the interconnect for the I/O board, Power and Locator buttons, and system/component status LEDs. The storage controller has an eight-disk backplane. Each drive has an LED indicator for Power/Activity, Fault, and Ok-To-Remove.

7410 Cables

The storage controller's internal cables are shown in the following figure and described in the table.



Cable	Connection
1 Hard Drive Data Cables (2)	Connections are between the HBA PCI-Express Card and the hard drive backplane.
2 Motherboard to Power Distribution Board Cable	Connection is between the power distribution board and the motherboard.
3 PSU Backplane Cable	To the power supply units
4 Top Cover Interlock	Connected to the power distribution board.

The 2U chassis form factor dimensions are as follows:

Dimension	Measurement
Height	87.85 mm/3.46 in
Width	445.71 mm/17.55 in (includes rack ears; chassis is 425.46 mm/16.75 in)
Depth	733.65 mm/28.88 in (includes PSU handle; the chassis is 711.25 mm/28.00 in)
Weight	Maximum: 25.6 kg/56.3 lbs

7410 I/O Components

The I/O components of the storage controller are shown in the following figure and identified in the table.

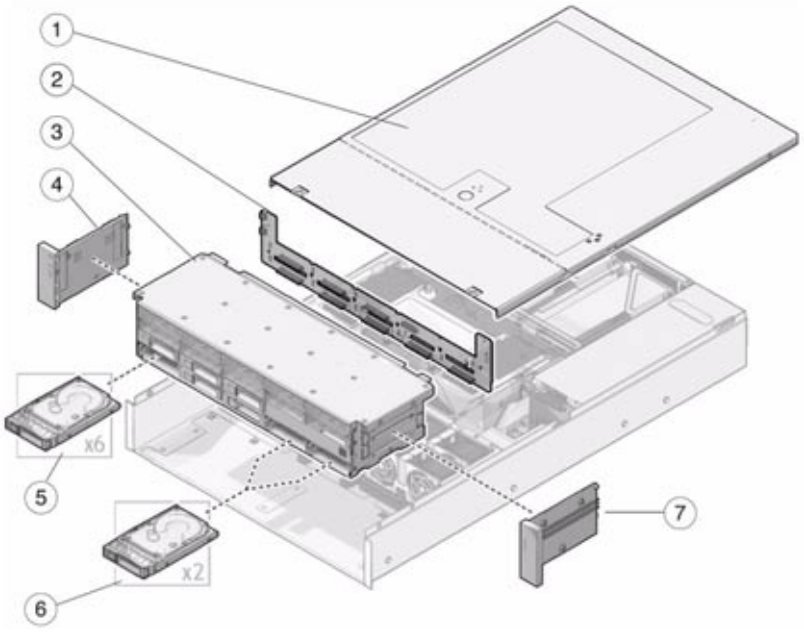


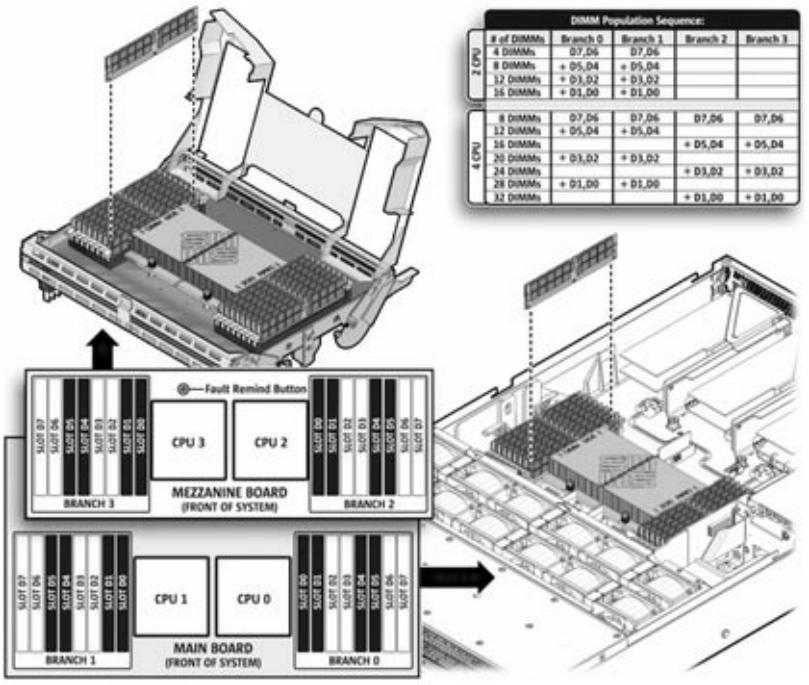
Figure Legend	
1 Top Cover	**5** ReadZilla Solid State Drives (SSDs) (6)
2 Hard Disk Backplane	**6** Hard Disk Drives (HDDs) (2)
3 Hard Disk Cage	**7** Right Control Panel Light Pipe Assembly
4 Left Control Panel Light Pipe Assembly	

7410 CPU and Memory Components

Memory is pre-configured on the 7410 system. There are 32 slots: 16 on the mezzanine tray, and 16 on the motherboard, in four branches, that hold industry-standard DDR2 DIMM modules. All DDR2 DIMMs must be the same *density* (type and capacity). The system supports the following configurations:

- From: 8 x 2GB DDR2 DIMMs (minimum configuration)
- To: 32 x 8GB DDR2 DIMMs (fully populated configuration)

At minimum, Branch 0 must be fully populated with two DDR2 DIMMs of the same density (same type).

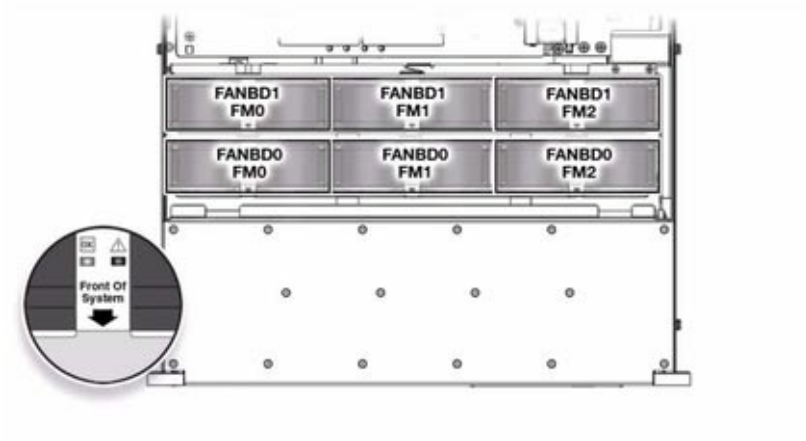


Refer to the service label on the cover for DDR2 DIMM placement information. Each CPU can support a maximum of eight DIMMs. The DIMM slots are paired and the DIMMs must be installed in pairs (0-1, 2-3, 4-5, and 6-7). The memory sockets are colored black or white to indicate which slots are paired by matching colors. DIMMs are populated starting from the outside (away from the CPU) and working toward the inside.

CPUs with only a single pair of DIMMs must have those DIMMs installed in that CPU's outside white DIMM slots (6 and 7). Only DDR2 667 MHz DIMMs are supported. Each pair of DIMMs must be identical (same manufacturer, size, and speed). DDR2 DIMM names in appliance logs and the Maintenance > Hardware view are displayed with the full name, such as /SYS/MB/P0/D7.

7410 Power Distribution, Fan Module and Disk Components

The Power Distribution/Fan Module components of the storage controller are shown in the following figures and identified in the table.



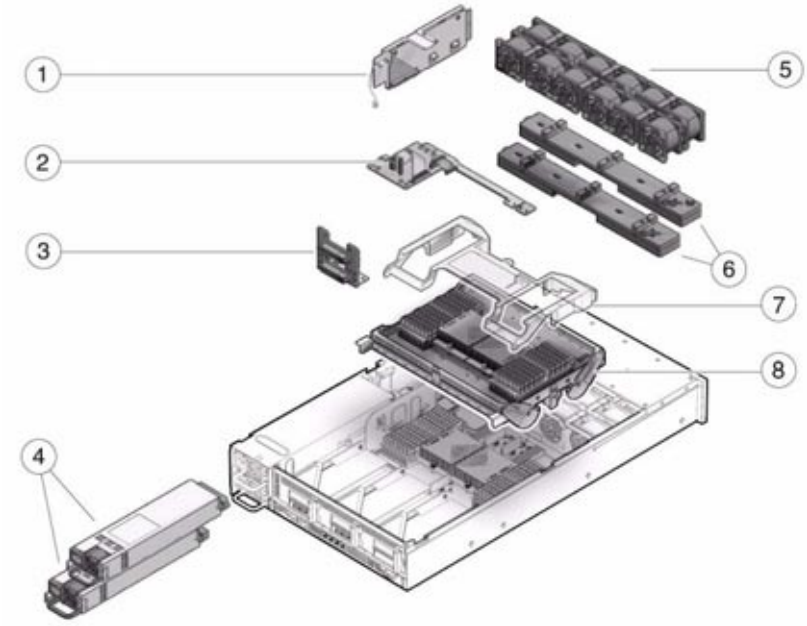
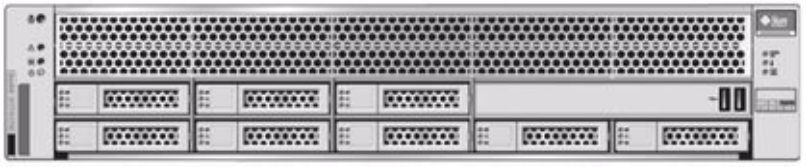


Figure Legend	
1 Paddle Card	**5** Fan Modules
2 Power distribution board/bus bar assembly	**6** Fan Boards
3 PSU Backplane	**7** Air Baffle
4 Power Supplies	**8** Mezzanine Tray

7410 Drive Locations

The 500GB Boot Drives (HDDs) reside in slots 6 and 7 as a mirrored set, and the Sun Storage ReadZilla Flash 2.5" 100GB solid state drives (SSD's), will fill in order, slots 0 through 5. You can have a maximum of 6 Sun Storage ReadZilla Flash SSD's.



Physical Drive Locations				
SSD1	SSD3	SSD5		
SSD0	SSD2	SSD4	HDD6	HDD7

7410 SAS-1 Rear Panel

The following graphic shows the 7410 SAS-1 rear panel. The 7410 SAS-1 PCIe expansion system is configured using two types of riser cards, as follows. Note that PCIe cards with x4, x8, or x16 mechanical finger pins will fit in any riser slot but will operate at the lane width of the slot. The Cluster Controller 100 (MFG Part #371-30224-01) belongs in PCIe slot 5. The SAS HBAs must all be of the same type and belong in slots 1 and slot 0.

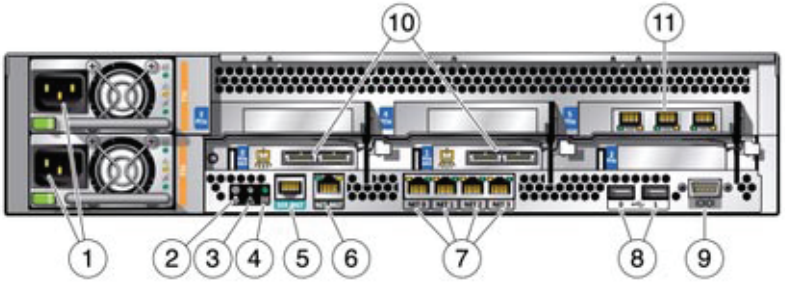


Figure Legend	
1 Power supplies	7 Ethernet ports
2 Locator LED button	8 USB ports
3 Service Required LED	9 VGA video port
4 Power OK LED	10 HBAs
5 Serial management port	11 Cluster card (cluster config. only)
6 Network management port	

7410 SAS-2 Rear Panel

The following graphic shows the 7410 SAS-2 rear panel.

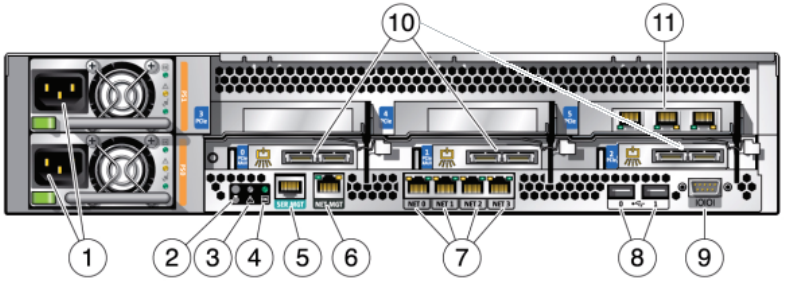


Figure Legend	
1 Power supplies	7 Ethernet ports
2 Locator LED button	8 USB ports

Figure Legend	
3 Service Required LED	9 VGA video port
4 Power OK LED	10 HBAs (slot 0 is optional only)
5 Serial management port	11 Cluster card (cluster config. only)
6 Network management port	

7410 SAS-2 PCIe Cards and Risers

The 7410 SAS-2 PCIe expansion system is configured using two types of riser cards, as follows. Note that PCIe cards with x4, x8, or x16 mechanical finger pins will fit in any riser slot but will operate at the lane width oft he slot. The Cluster Controller 100 (MFG Part #371-30224-01) belongs in PCIe slot 5. The Cluster Controller 200 belongs in PCIe slot 5. The SAS HBAs must all be oft he same type and belong in slots 1 and 2 with an optional third SAS HBA in slot 0.

Riser/Slot Numbers	Electrical	Mechanical	Source
Riser 0 - Slot 0 (optional 3rd internal SAS HBA)	x8	x8	MCP55
Riser 0 - Slot 3	x8	x8	MCP55
Riser 1 - Slot 1 (internal SAS HBA)	x8	x8	MCP55
Riser 1 - Slot 4	x8	x8	IO55
Riser 2 - Slot 2 (internal SAS HBA)	x16	x16	IO55
Riser 2 - Slot 5	x4	x8	IO55

The serial management connector (SERIAL MGT) is an RJ-45 connector and a terminal connection to the SP console.

The network management connector (NET MGT) is an RJ-45 connector on the motherboard and provides a LAN interface to the SP console.

There are four RJ-45 Gigabit Ethernet connectors (NET0, NET1, NET2, NET3) located on the motherboard that operate at 10/100/1000 Mbit/sec. These network interfaces must be configured before use.

7410 Front Panel

The following graphic shows the front panel LEDs and buttons.

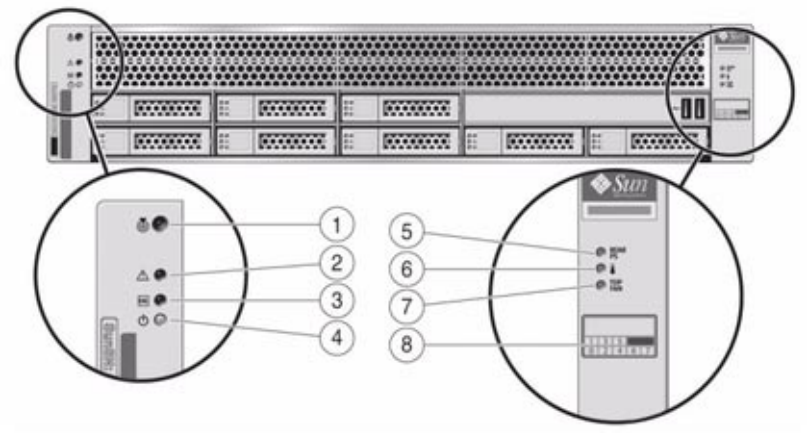


Figure Legend	
1 Locator LED/Locator button (white)	**5** Power Supply Service Required LED (amber)
2 Service Action Required LED (amber)	**6** System Overtemperature LED (amber)

Figure Legend	
3 Power/OK LED (green)	**7** Fan Module Service Required LED (amber)
4 Power button	**8** Hard Disk Drive map

7410 SAS-1 Single and Cluster Controller Configurations

The following table shows the configuration options for a single controller 7410 SAS-1. All PCIe cards are low-profile, and must be fitted with low-profile mounting brackets. Note that 10Gb Ethernet NIC cards **must not** be combined with 1Gb Ethernet NIC cards in the same system.

This table describes single base configurations for 7410 SAS-1.

Sun Mktg Part Number	Description	Mfg Part Number
XTB7410-24AS000	S7410, 16GB, 2x2.3G-6C	594-4676-0
XTB7410-24AS100	S7410, 64GB, 2x2.3G-6C, READ-100G	594-5131-04
XTB7410-44AS200	S7410, 128GB, 4x2.3G-6C, READ-200G	594-5132-03

This table describes cluster base configurations for 7410 SAS-1.

Sun Mktg Part Number	Description	Mfg Part Number
XTB7410C24AS000	S7410C, 16GB, 2x2.3G-6C	594-5842-01
XTB7410C24AS100	S7410C, 32GB, 2x2.3G-6C, READ-100G	594-5843-01
XTB7410C44AS200	S7410C, 64GB, 4x2.3G-6C, READ-200G	594-5844-01

This table describes NIC and HBA options for single and cluster configurations for 7410 SAS-1.

Sun Mktg Part Number	Description	Mfg Part Number
SG-XPCIESAS-S7-Z	2-port SAS (x4) HBA, PCIe	594-6620-01
SG-XPCIE2FC-QF4	2-port FC HBA, 4Gb, PCIe	594-2018-02
SG-XPCIE2FC-QF8-Z	2-port FC HBA, 8Gb, PCIe	594-5684-01
SGXPCIE2SCSIU320Z	2-port SCSI HBA, PCIe	594-2019-04
X7280A-2	2-port 10/100/1000 NIC, PCIe	594-1755-04
X7281A-2	2-port MMF (Optical) NIC, PCIe	594-1756-03
X4446A-Z	4-port PCIe Quad GigE UTP	594-4024-01

Sun Mktg Part Number	Description	Mfg Part Number
X1027A-Z	2-port 10Gig NIC, PCIe	594-4110-03

This table describes the supported single and clustered PCIe configuration option summary for 7410 SAS-1 (without 10GigE cards).

Slot	Slot Type	Sun Part Number	Vendor Part Number	Description	Note
0	PCIe	375-3487-05	LSI 3801E	DP SAS HBA	Base Configuration
1	PCIe	375-3487-05	LSI 3801E	DP SAS HBA	Base Configuration
2	PCIe	371-0905-04	Intel EXPI9402PT	DP Copper NIC	Optional Allowed Alternative
2	PCIe	371-0904-03	Intel EXPI9402PF	DP Optical NIC	Optional Allowed Alternative
2	PCIe	375-3481-01	Intel EXPI9404PT	QP Copper NIC	Optional Recommended Front-end
2	PCIe	375-3606-02	Sun Dual Port 40Gb/sec 4x	Infiniband QDR	Host Channel Adapter PCI Express
2	PCIe	371-4325-01	QLogic	8Gb DP FC HBA	Optional FC Target or Initiator (Back
3	PCIe	371-0905-04	Intel EXPI9402PT	DP Copper NIC	Optional Allowed Alternative
3	PCIe	371-0904-03	Intel EXPI9402PF	DP Optical NIC	Optional Allowed Alternative
3	PCIe	375-3481-01	Intel EXPI9404PT	QP Copper NIC	Additional Optional Recommended
3	PCIe	375-3606-02	Sun Dual Port 40Gb/sec 4x	Infiniband QDR	Host Channel Adapter PCI Express
3	PCIe	371-4325-01	QLogic	8Gb DP FC HBA	Optional FC Target or Initiator (Back
3	PCIe	375-3487-05	LSI 3801E	DP SAS HBA	Alternative 3rd if no tape backup
4	PCIe	375-3606-02	Sun Dual Port 40Gb/sec 4x	Infiniband QDR	Host Channel Adapter PCI Express
4	PCIe	371-0905-04	Intel EXPI9402PT	DP Copper NIC	Optional Allowed Alternative
4	PCIe	371-0904-03	Intel EXPI9402PF	DP Optical NIC	Optional Allowed Alternative
4	PCIe	375-3481-01	Intel EXPI9404PT	QP Copper NIC	Optional Recommended Front-end
4	PCIe	375-3487-05	LSI 3801E	DP SAS HBA	Additional Optional Back-end
4	PCIe	371-4325-01	QLogic	8Gb DP FC HBA	Optional FC Target or Initiator (Back
5 (single) 4 (cluster)	PCIe	375-3356-02	QLogic QLE2462L	DP 4Gb FC HBA	Optional (Tape BU)
5 (single) 4 (cluster)	PCIe	375-3357-05	LSI LSI22320SLE	DP SCSI HBA	Optional (Tape BU)

Slot	Slot Type	Sun Part Number	Vendor Part Number	Description	Note
5 (N/A for single)	PCIe	371-3024-01	Sun	cluster card	Base Configuration

This table describes the supported single and clustered PCIe configuration option summary for 7410 SAS-1 (with 10GigE cards).

Slot	Slot Type	Sun Part Number	Vendor Part Number	Description	Note
0	PCIe	375-3487-05	LSI 3801E	DP SAS HBA	Base Configuration
1	PCIe	375-3487-05	LSI 3801E	DP SAS HBA	Base Configuration
2	PCIe	501-7283-07	Sun	DP Optical 10GE NIC	Additional Optional Recommended Front-end
3	PCIe	501-7283-07	Sun	DP Optical 10GE NIC	Additional Optional Recommended Front-end
4	PCIe	375-3487-05	LSI 3801E	DP SAS HBA	Additional Optional Recommended Back-end
5 (single) 4 (clustered)	PCIe	375-3356-02	QLogic QLE2462L	DP 4Gb FC HBA	Optional (Tape BU)
5 (single) 4 (clustered)	PCIe	375-3357-05	LSI LSI22320SLE	DP SCSI HBA	Optional (Tape BU)
5 (N/A for single)	PCIe	371-3024-01	Sun	cluster card	Base Configuration

7410 SAS-2 Single and Cluster Controller Configurations

The following table shows the configuration options for a single controller for SAS-2. All PCIe cards are low-profile, and must be fitted with low-profile mounting brackets. Note that 10Gb Ethernet NIC cards **must not** be combined with 1Gb Ethernet NIC cards in the same system.

This table describes single base configurations for 7410 SAS-2.

Sun Mktg Part Number	Description	Mfg Part Number
TC7410-26AR064	S7410, 64GB, 2x6C	597-0741-01
TC7410-46AR128	S7410, 128GB, 2x6C	597-0742-01
TC7410-46AR256	S7410, 256GB, 4x6C	597-0743-01

This table describes cluster base configurations for 7410 SAS-2.

Sun Mktg Part Number	Description	Mfg Part Number
TC7410-26AR064HA	S7410C, 64GB, 2x6C	597-0744-01
TC7410-46AR128HA	S7410C, 128GB, 2x6C	597-0745-01
TC7410-46AR256HA	S7410C, 256GB, 4x6C	597-0746-01

This table describes NIC and HBA options for single and cluster configurations for 7410 SAS-2.

Sun Mktg Part Number	Description	Mfg Part Number
SG-PCIESAS-GEN2-Z	8-port SAS (x4) HBA, PCIe	596-7897-01
SG-PCIE2FC-QF4	2-port FC HBA, 4Gb, PCIe	596-5430-02
SG-XPCIE2FC-QF8-Z	2-port FC HBA, 8Gb, PCIe	594-5684-01
SG-PCIE2SCSIU320Z	2-port SCSI HBA, PCIe	596-5431-04
7280A-2	Sun 2-port GigE UTP, PCIe	596-5556-01
4237A	2-port 4X IB HCA PCIe	594-5862-02
7281A-2	2-port MMF (Optical) NIC, PCIe	596-5557-01
4446A-Z	4-port PCIe Quad GigE UTP	596-6762-01
1027A-Z	2-port 10GigE Fiber, PCIe	596-6725-01

This table describes the supported single and clustered PCIe configuration option summary for 7410 SAS-2 (without 10GigE cards).

Slot	Slot Type	Sun Part Number	Vendor Part Number	Description	Note
0	PCIe	375-3487-02	LSI 3801E	DP SAS HBA	Base Configuration
0	PCIe	375-3609-03	Sun Two-port SASx4 HBA	Storage shelf connector	Optional Third
1	PCIe	375-3487-02	LSI 3801E	DP SAS HBA	Base Configuration
1	PCIe	375-3609-03	Sun Two-port SASx4 HBA	Storage shelf connector	Base Configuration
2	PCIe	375-3609-03	Sun Two-port SASx4 HBA	Storage shelf connector	Optional Recommended Backend
2	PCIe	371-0905-03	Intel EXPI9402PT	DP Copper NIC	Optional Allowed Alternative
2	PCIe	371-0904-03	Intel EXPI9402PF	DP Optical NIC	Optional Allowed Alternative
2	PCIe	375-3481-01	Intel EXPI9404PT	QP Copper NIC	Optional Recommended Front-end
2	PCIe	375-3606-01	Sun Dual Port 40Gb/sec 4x	Infiniband QDR	Host Channel Adapter PCI Express

Slot	Slot Type	Sun Part Number	Vendor Part Number	Description	Note
2	PCIe	371-4325-01	QLogic	8Gb DP FC HBA	Optional FC Target or Initiator (Backup)
3	PCIe	371-0905-03	Intel EXPI9402PT	DP Copper NIC	Optional Allowed Alternative
3	PCIe	371-0904-03	Intel EXPI9402PF	DP Optical NIC	Optional Allowed Alternative
3	PCIe	375-3481-01	Intel EXPI9404PT	QP Copper NIC	Additional Optional Recommended Front-end
3	PCIe	375-3606-01	Sun Dual Port 40Gb/sec 4x	Infiniband QDR	Host Channel Adapter PCI Express
3	PCIe	371-4325-01	QLogic	8Gb DP FC HBA	Optional FC Target or Initiator (Backup)
4	PCIe	375-3606-01	Sun Dual Port 40Gb/sec 4x	Infiniband QDR	Host Channel Adapter PCI Express
4	PCIe	371-0905-03	Intel EXPI9402PT	DP Copper NIC	Optional Allowed Alternative
4	PCIe	371-0904-03	Intel EXPI9402PF	DP Optical NIC	Optional Allowed Alternative
4	PCIe	375-3481-01	Intel EXPI9404PT	QP Copper NIC	Optional Recommended Front-end
4	PCIe	375-3487-02	LSI 3801E	DP SAS HBA	Additional Optional Recommended Back-end
5 (single) 4 (cluster)	PCIe	375-3356-02	QLogic QLE2462L	DP 4Gb FC HBA	Optional (Tape BU)
4	PCIe	371-4325-01	QLogic	8Gb DP FC HBA	Optional FC Target or Initiator (Backup)
5 (single) 4 (cluster)	PCIe	375-3357-05	LSI LSI22320SLE	DP SCSI HBA	Optional (Tape BU)
5 (N/A for single)	PCIe	371-3024-01	Sun	cluster card	Base Configuration

This table describes the supported single and clustered PCIe configuration option summary for 7410 SAS-2 (with 10GigE cards).

Slot	Slot Type	Sun Part Number	Vendor Part Number	Description	Note
0	PCIe	375-3487-02	LSI 3801E	DP SAS HBA	Base Configuration
0	PCIe	375-3609-03	Sun Two-port SASx4 HBA	Storage shelf connector	Optional third
1	PCIe	375-3487-02	LSI 3801E	DP SAS HBA	Base Configuration
1	PCIe	375-3609-03	Sun Two-port SASx4 HBA	Storage shelf connector	Base Configuration
2	PCIe	375-3609-03	Sun Two-port SASx4 HBA	Storage shelf connector	Optional Recommended Backend
2	PCIe	501-7283-07	Sun	DP Optical 10GE NIC	Additional Optional Recommended Front-end

Slot	Slot Type	Sun Part Number	Vendor Part Number	Description	Note
4	PCIe	375-3487-02	LSI 3801E	DP SAS HBA	Additional Optional Recommended Back-end
5 (single) 4 (clustered)	PCIe	375-3356-02	QLogic QLE2462L	DP 4Gb FC HBA	Optional (Tape BU)
5 (single) 4 (clustered)	PCIe	375-3357-05	LSI LSI22320SLE	DP SCSI HBA	Optional (Tape BU)
5 (N/A for single)	PCIe	371-3024-01	Sun	cluster card	Base Configuration

7410 SAS-1 Storage Disk Shelf

The user-accessible storage for the 7410 system is provided by one to four J4400/Sun disk shelves. Typically a shelfi s fully-populated with 24 drives unless only one shelfi s used, in which case the shelf may be half-populated with 12 drives. Expanding beyond one shelf requires that all shelves are fully-populated with 24 drives each.

7410 SAS-2 Storage Disk Shelf

The 7410 single and cluster controller configurations allow one to three chains of 1 to 4 Sun Disk Shelves. Any combination of disk-only and Logzilla-capable shelves may be combined within the chain in any order. The cabling configurations are unchanged. Half-populated shelf configurations are not supported for SAS-2.

See Disk Shelf Overview for component specifications and diagrams.

See Also

- Controller Details
- Disk Shelf Details

Details

Controller Maintenance Procedures

This section provides procedural details for customer replaceable components (CRU) of any storage controller in the Sun Storage Unified Storage product family. Refer to Disk Shelf Details for replacing shelf components.

Prerequisites

- Read the information in the overview section for your model and become familiar with the replaceable parts of the system:
- 7110 Overview
- 7210 Overview
- 7310 Overview
- 7410 Overview
- Follow the instructions in the Safety Information and Required Tools and Serial Numbers sections.

Safety Information

Never attempt to run the storage controller with the covers removed. Hazardous voltage is present that could cause injury. The covers must be in place for proper air flow to prevent equipment damage. For your protection, observe the following safety precautions when setting up your equipment:

- Follow all Sun cautions, warnings, and instructions marked on the equipment and described in Important Safety Information for Sun Hardware Systems.
- Ensure that the voltage and frequency of your power source match the voltage inscribed on the equipment's electrical rating label.
- Follow the electrostatic discharge safety practices as described in this section.

Electrostatic discharge (ESD) sensitive devices - such as the motherboards, PCI cards, hard disk drives, and memory cards - require special handling. Circuit boards and hard disk drives contain electronic components that are extremely sensitive to static electricity. Ordinary amounts of static electricity from clothing or the work environment can destroy the components located on these boards. Do not touch the components without antistatic precautions, especially along the connector edges.

Required Tools and Serial Numbers

The following tools are needed to service the storage controller.

- Antistatic wrist strap - Wear an antistatic wrist strap and use an antistatic mat when handling components such as hard disk drive assemblies, circuit boards, or PCI cards. When servicing or removing storage controller components, attach an antistatic strap to your wrist and then to a metal area on the chassis. Following this practice equalizes the electrical potentials between you and the storage controller.
- Antistatic mat - Place static-sensitive components such as motherboards, memory, and printed circuit boards (PCBs) on an antistatic mat.

- No.2 Phillips screwdriver
- Nonconducting No.1 flat-blade screwdriver (for battery removal), or equivalent
- Nonconducting stylus or pencil (to power on the storage controller)
- Chassis serial number: To obtain support for your storage controller or to order new parts, you need your chassis serial number. You can find a chassis serial number label on the storage controller front panel on the left side. Another label is on the top of the storage controller. Alternatively, click the Sun logo in the BUI masthead to obtain the serial number or issue the following command:

```
knife: maintenance hardware show
```

Tasks

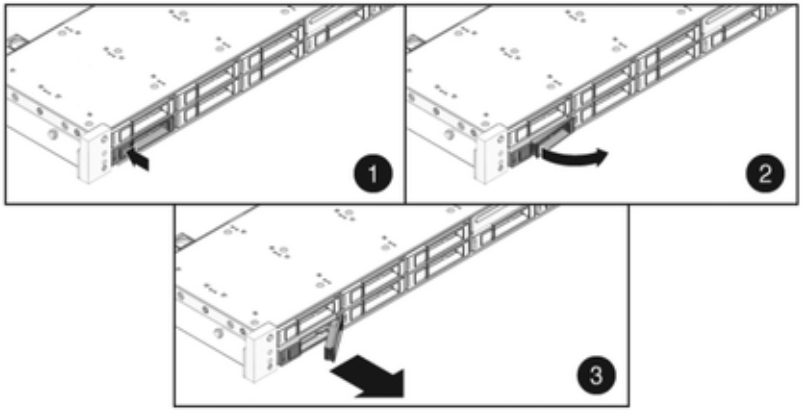
Details Tasks

▼ Replacing a Drive

1 **Identify the HDD or SSD that you want to remove. Note that on the 7210, you need to remove the Hard Disk Drive Access cover using a No.2 Phillips screwdriver first. The amber Service Required LED indicates an active problem with the drive. Go to the Maintenance > Hardware section of the BUI and click to view Details for HDDs or to turn on the locator LED.**

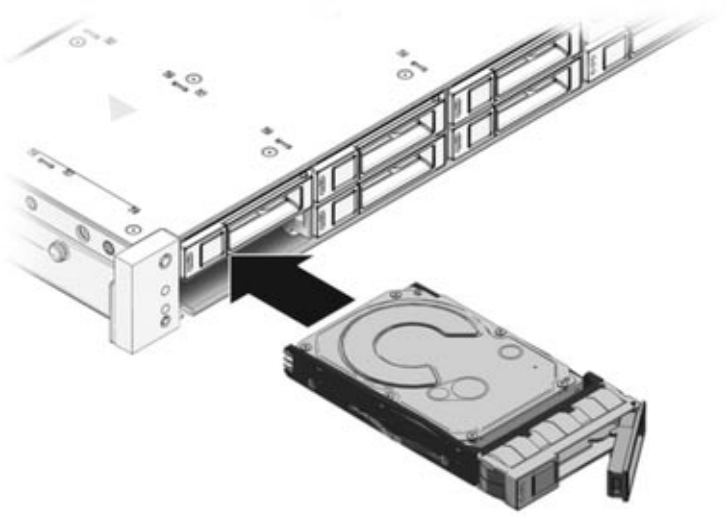
2 **On the drive you plan to remove, push the drive release button to open the latch.**

3 **Grasp the latch and pull the drive out of the drive slot. The latch is not an ejector. Do not bend it too far to the right; doing so can damage the latch.**



4. **Wait 15 seconds, and go to the Hardware > Maintenance screen of the BUI and click on the controller to verify that the software has detected the missing or failed drive.**

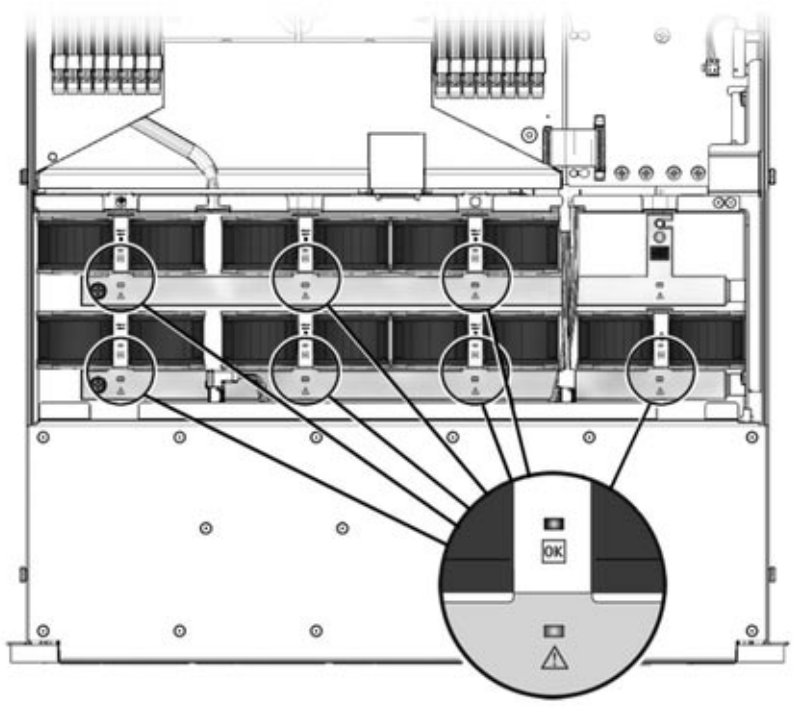
5. **Slide the replacement HDD or SSD into the slot, until it is fully seated.**



6. **Close the latch to lock the hard disk or solid state drive in place. The Unified Storage System software automatically detects and configures the new drive. The device appears in the BUI Maintenance > Hardware screen when you view details for the controller.**

▼ Replacing a Fan Module

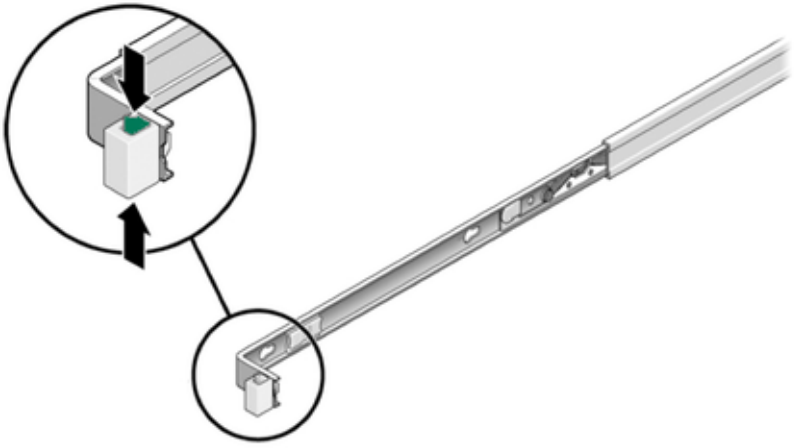
Fan modules are hot-swappable and can be removed and installed while the storage controller is running without affecting other hardware capabilities. Each fan module contains LEDs that are visible when you open the fan tray access door. An amber colored LED indicates a faulty fan module. The following illustration shows the location of fan modules and their LEDs in the storage controller.



1. **To locate the chassis you want to service, click the associated ☼ icon on the Maintenance > Hardware screen of the BUI or issue the `set /SYS/LOCATE status=on` command at the service processor (SP) prompt.**

2. **Verify that no cables will be damaged or will interfere when the storage controller is extended from the rack.**

3 **From the front of the storage controller, release the two slide release latches.**

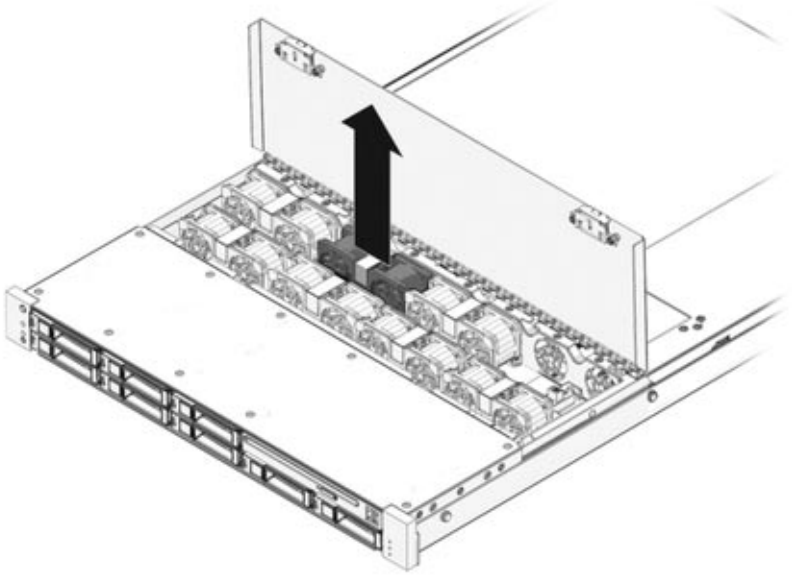


4 **While squeezing the slide release latches, slowly pull the storage controller forward until the slide rails latch.**

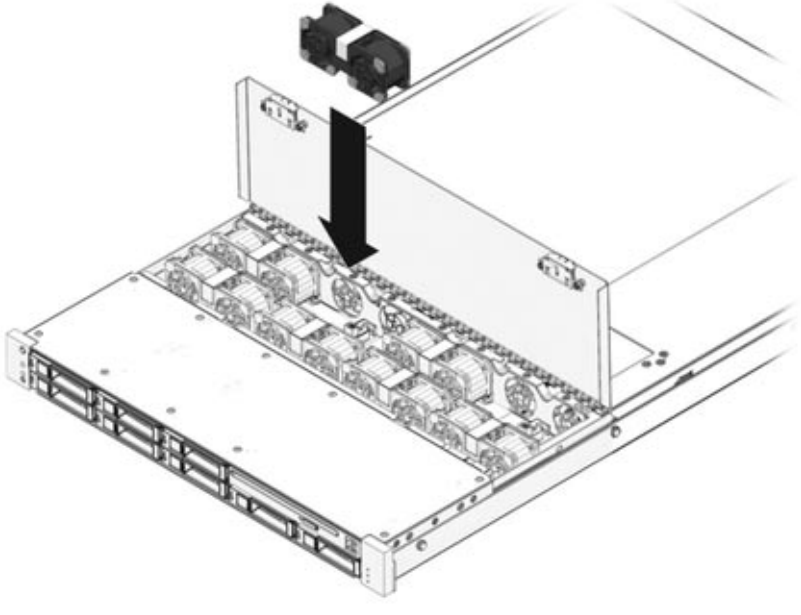
5 **Unlatch the fan module door. Pull the release tabs back to release the door. Note that on the 7210, you need to loosen the two captive screws on the fan tray access cover using a No.2 Phillips screwdriver. Open the top cover toward the rear of the storage controller.**

6 **Identify the faulty fan module by locating the corresponding Service Required LED or by clicking the icon on Maintenance > Hardware screen of the BUI for the fan you want to replace.**

7 Using thumb and forefinger in between the two fans, pull the fan module up and out.



8 Install the replacement fan module into the storage controller fan slot.



9 **Apply firm pressure to fully seat the fan module.**

10 **Verify that the Fan OK LED is lit, and that the Fan Fault LED on the replaced fan module is dim.**

11 **Close the top cover door immediately after replacing the fan to maintain airflow in the storage controller. Leaving the door open for more than 60 seconds while the storage controller is running might cause it to overheat and shut down.**

12 **Verify that the Top Fan LED, Service Required LEDs, and the Locator LED/Locator button are dim.**

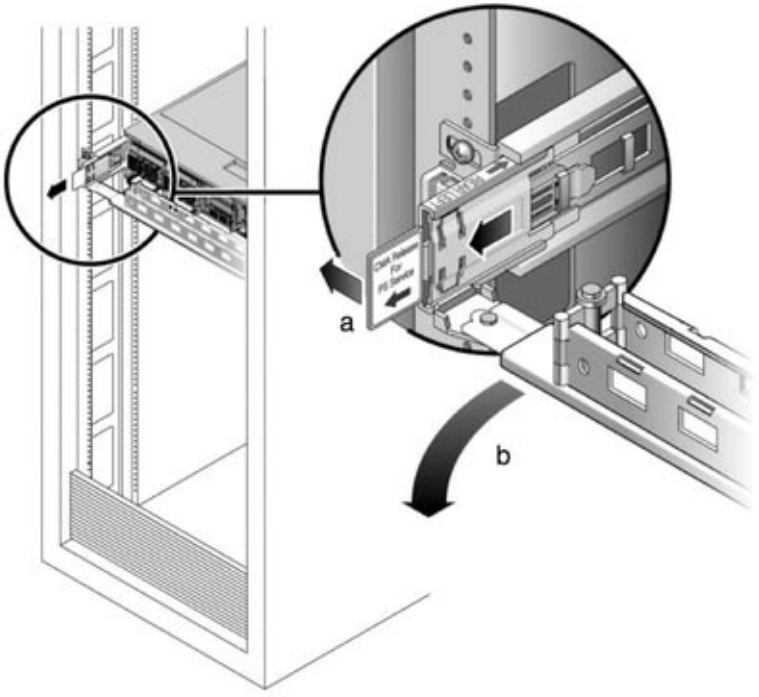
13 **Push the release tabs on the side of each rail and slowly slide the storage controller into the rack.**

▼ Replacing a Power Supply

The storage controller is equipped with redundant hot-swappable power supplies. If a power supply fails and you do not have a replacement, leave the failed power supply installed to ensure proper air flow. A failed power supply is indicated by an amber colored LED.

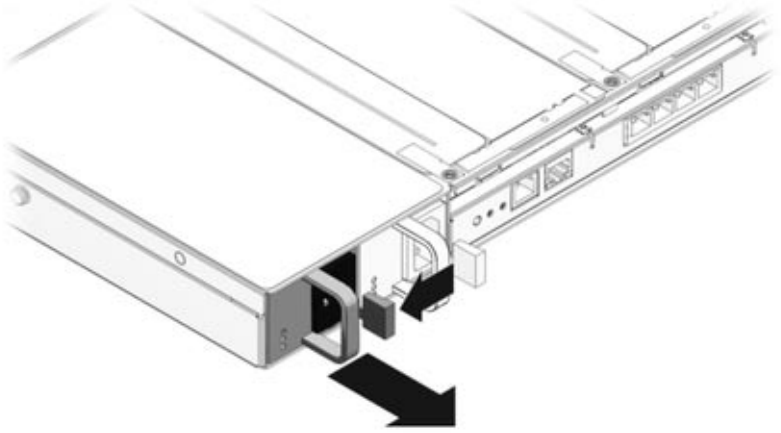
1 **Gain access to the rear of the storage controller where the faulted power supply is located.**

2 **If installed, press and hold the CMA release tab and rotate the arm out of the way.**



3 **Disconnect the power cord from the faulted power supply.**

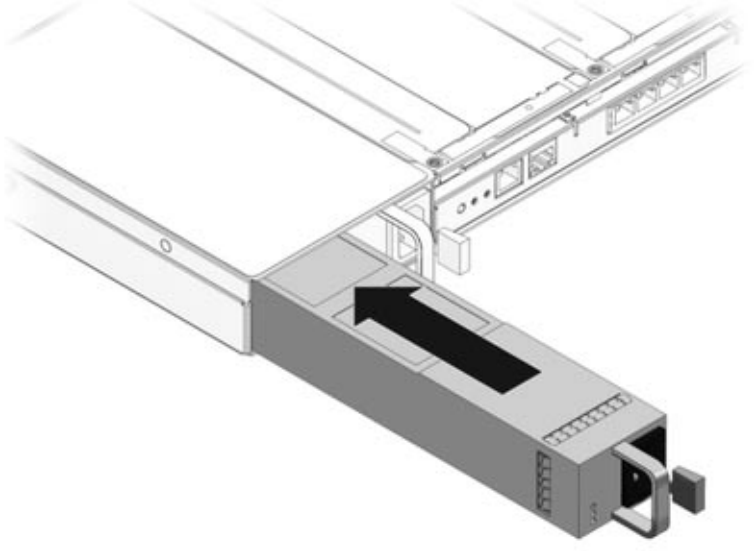
4 **Grasp the power supply handle and press the release latch.**



5 **Pull the power supply out of the chassis.**

6 **Align the replacement power supply with the empty power supply chassis bay.**

7 **Slide the power supply into the bay until it is fully seated.**



8. **Reconnect the power cord to the power supply.**

9. **Verify that the green AC Present LED is lit.**

10. **Close the CMA, inserting the CMA into the rear left rail bracket.**

11. **Go to the Maintenance > Hardware screen of the BUI. Click for the controller and then click PSU to verify that the icon is green for the newly installed power supply.**

Replacing RAM

DIMM faults are indicated by an amber colored LED on the motherboard. Go to the Maintenance > Hardware screen of the BUI and click on the controller and then click DIMMs to locate the faulty component, indicated by the icon. This procedure requires that you handle components that are sensitive to static discharge, which can cause the component to fail. To avoid damage, wear an antistatic wrist strap and use an antistatic mat when handling components.

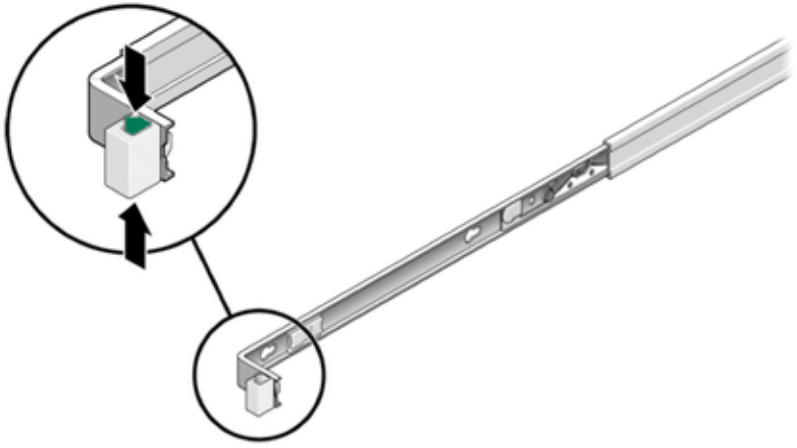
You **must** shutdown the appliance before beginning this task. Note that there will be a loss of access to the storage unless the system is in a 7310 or 7410 clustered configuration. Shut down the appliance using one of the following options:

- Login to the BUI and click the power icon on the left side of the masthead.
- SSH into the appliance and issue the **maintenance system poweroff** command.
- SSH or serial console into the service processor (SP) and issue the **stop /SYS** command.
- Use a pen or non-conducting pointed object to press and release the Power button on the front panel.
- To initiate emergency shutdown, wherein all applications and files will be closed abruptly without saving, press and hold the power button for at least four seconds until the Power/OK LED on the front panel flashes, indicating that the storage controller is in standby power mode.

1. **Disconnect the AC power cords from the rear panel of the storage controller. If you are servicing a 7210, remove the system controller by loosening the captive screw, pulling the handle and sliding it out of the chassis and then continue to Step 9 below.**

2. **Verify that no cables will be damaged or will interfere when the storage controller is extended from the rack.**

3 **From the front of the storage controller, release the two slide release latches.**



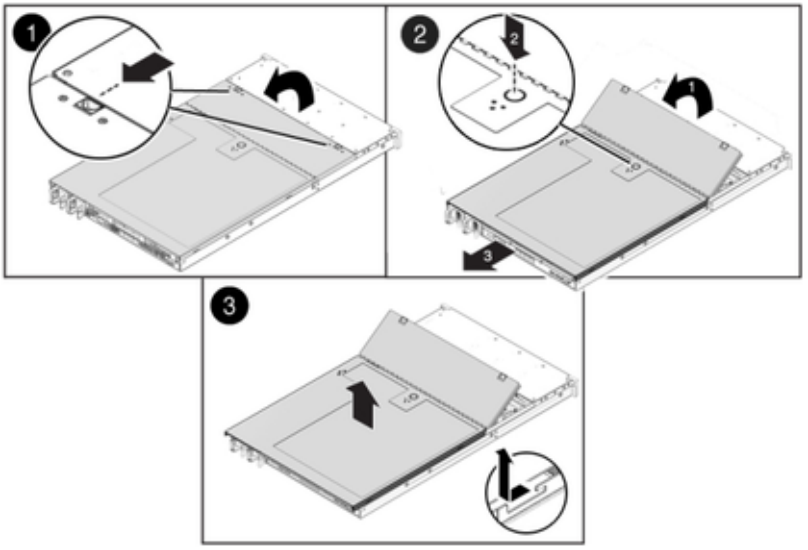
4 **While squeezing the slide release latches, slowly pull the storage controller forward until the slide rails latch.**

5 **Unlatch the fan module door, pull the two release tabs back, rotate the fan door to the open position and hold it there.**

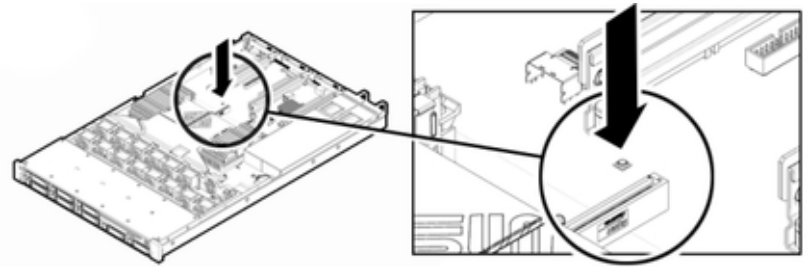
6 **Press the top cover release button and slide the top cover to the rear about a half-inch (1.3 cm).**

7 **Lift up and remove the top cover. If you are servicing a 7410 system, you will also need to lift up the air duct if the DIMM you want to replace is on the mezzanine board, or remove the**

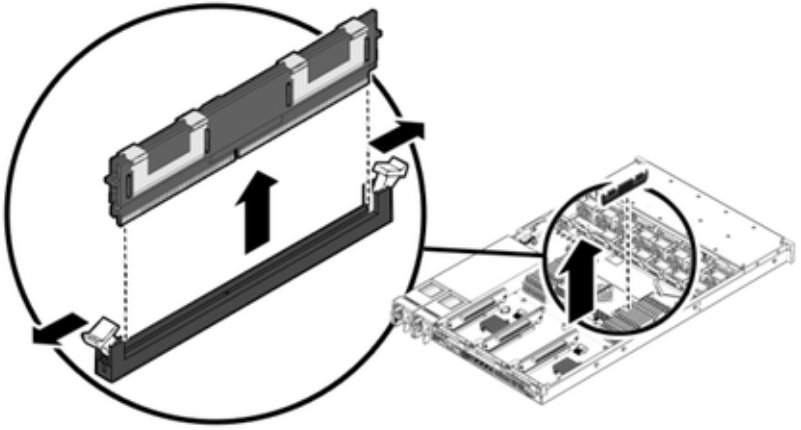
mezzanine tray if the DIMM you want to replace is on the motherboard.



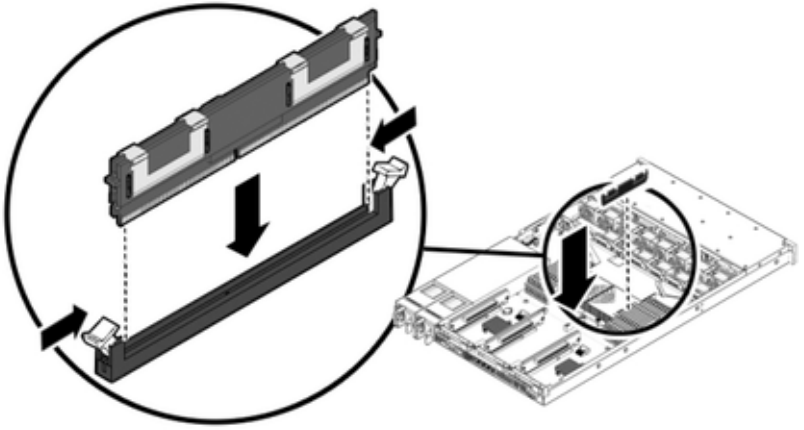
8 To locate the DIMM you want to service, press the Fault Remind Button on the storage controller.



9 **Push down on the ejector tabs on each side of the DIMM until the DIMM is released.**



10 **Line up the replacement DIMM with the connector, aligning the notch with the key to ensure that the component is oriented correctly.**

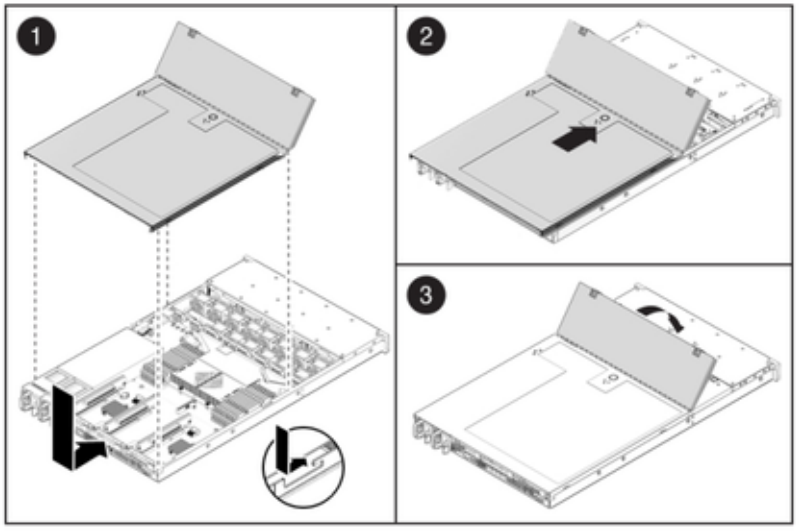


11 **Push the DIMM into the connector until the ejector tabs lock the component in place.**

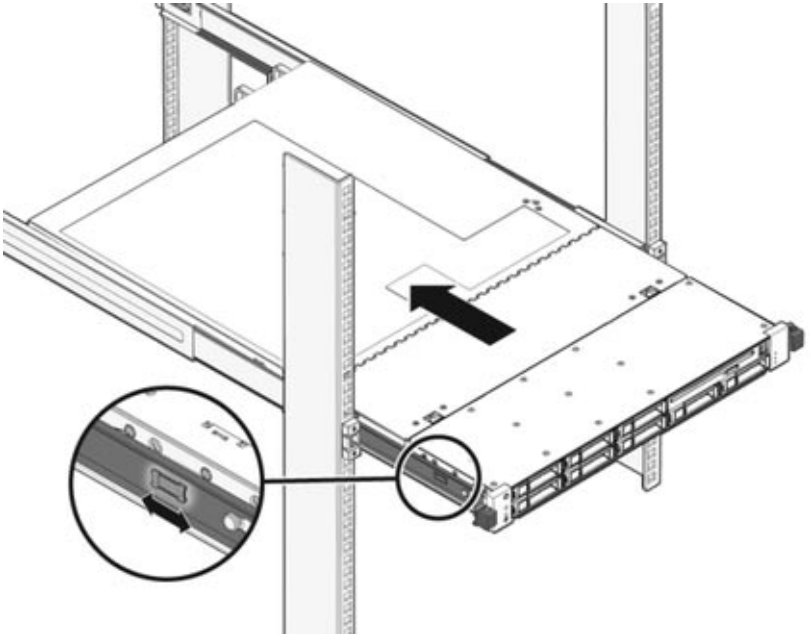
12 **Place the top cover on the chassis so that is hangs over the rear of the storage controller by about an inch (2.5 cm).**

13 **Slide the top cover forward until it seats.**

14 Close the fan cover and engage the fan cover latches. The cover must be completely closed for the storage controller to power on.



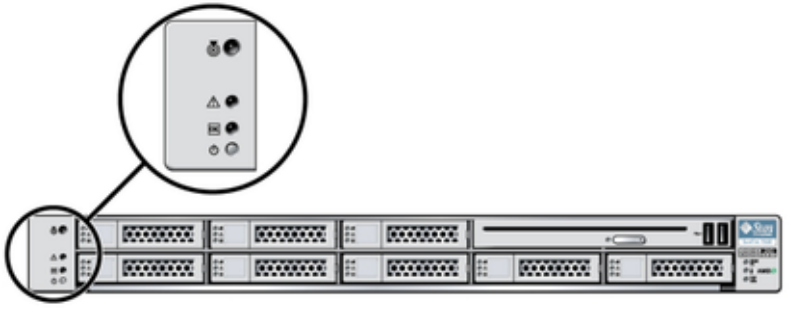
15 Push the release tabs on the side of each rail and slowly push the storage controller into the rack, making sure no cables obstruct the path of the controller.



16 **Connect the power cords to the power supplies.**

17 **Verify that standby power is on, indicated by the Power/OK LED flashing on the front panel about two minutes after the power cords are plugged in.**

18 **Use a pen, or other pointed object, to press and release the recessed Power button on the storage controller front panel.**



The Power/OK LED next to the Power button lights and remains lit. The Maintenance > Hardware screen of the BUI provides status of the replacement on the Details page for DIMMs.

▼ Replacing PCIe Cards and Risers

Note that PCI-e cards are not customer-replaceable in the Sun Storage 7210 system. Contact a Sun field service representative for assistance with 7210 PCI-e card and riser replacement.

Go to the Maintenance > Hardware screen of the BUI and click ➔ on the controller and then click Slots to locate the faulty component. This procedure requires that you handle components that are sensitive to static discharge, which can cause the component to fail. To avoid damage, wear an antistatic wrist strap and use an antistatic mat when handling components.

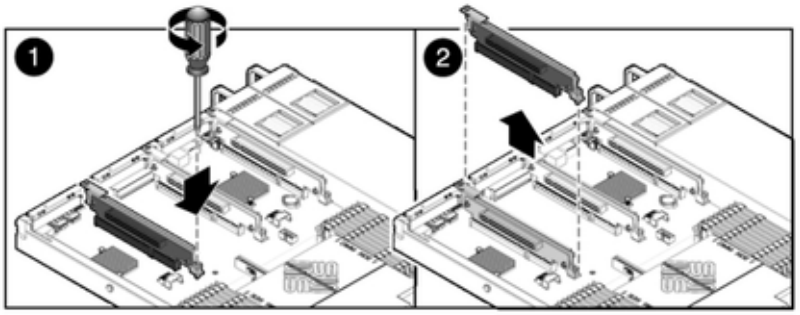
Note that all HBAs must be of the same type and it is recommended that you upgrade to the latest Sun Storage 7000 software before installing a newly released HBA.

You **must** shutdown the appliance before beginning this task. Note that there will be a loss of access to the storage unless the system is in a 7310 or 7410 clustered configuration. Shut down the appliance using one of the following options:

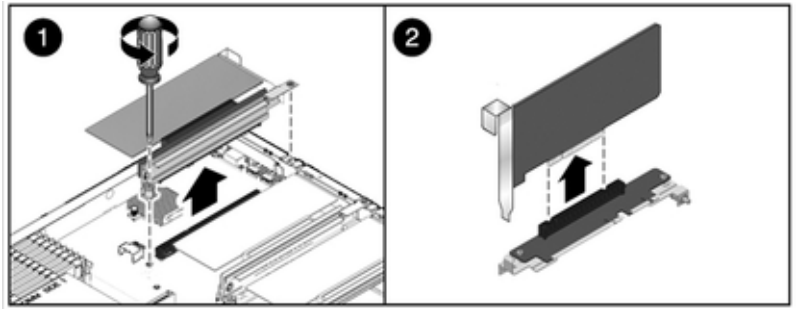
- Login to the BUI and click the power icon on the left side of the masthead.
- SSH into the storage system and issue the **maintenance system poweroff** command.
- SSH or serial console into the service processor (SP) and issue the **stop /SYS** command.
- Use a pen or non-conducting pointed object to press and release the Power button on the front panel.
- To initiate emergency shutdown, wherein all applications and files will be closed abruptly without saving, press and hold the power button for at least four seconds until the Power/OK LED on the front panel flashes, indicating that the storage controller is in standby power mode.

1. **Disconnect the AC power cords from the rear panel of the storage controller.**
2. **Verify that no cables will be damaged or will interfere when the storage controller is extended from the rack.**
3. **From the front of the storage controller, release the two slide release latches.**
4. **While squeezing the slide release latches, slowly pull the storage controller forward until the slide rails latch.**
5. **Unlatch the fan module door, pull the two release tabs back, rotate the fan door to the open position and hold it there.**
6. **Press the top cover release button and slide the top cover to the rear about a half-inch (1.3 cm).**
7. **Lift up and remove the top cover.**
8. **Locate the PCIe card position in the storage controller, see Single and Cluster Controller Configurations for the 7310, the 7110 Overview, or 7410 Overview.**
9. **Disconnect any data cables connected to the cards on the PCIe riser you want to replace. Label the cables for proper connection later.**
10. **Loosen the two captive Phillips screws on the end of the rear panel crossbar and lift the crossbar up and back to remove it.**
11. **Loosen the captive retaining screw holding the front end of the riser and the Phillips screw on the end of the riser.**

12 Lift the riser up to remove it from the storage controller.



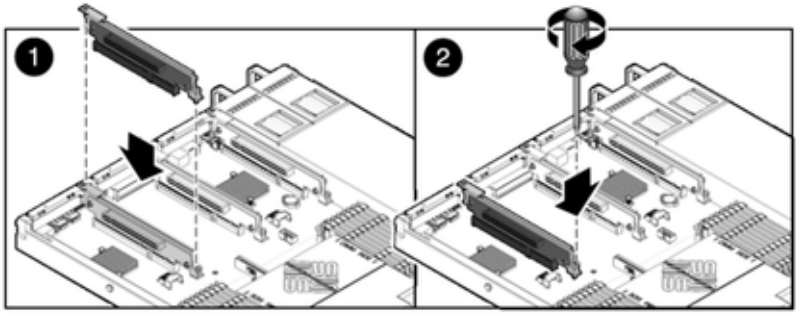
13 Carefully remove the PCIe card from the riser board connector and clean the slot with filtered, compressed air if necessary.



14 Seat the PCIe card in the riser slot.

15 Connect the cables.

16 Align the riser and attached PCIe card, with the intended location on the motherboard, and carefully insert it into its slot.



17 **Slide the back of the riser into the motherboard rear panel stiffener.**

18 **Tighten the screw that secures the riser to the motherboard.**

19 **Replace the rear panel PCI crossbar by sliding it down over the PCIe risers, ensuring the crossbar is secured with two captive Phillips screws.**

20 **Place the top cover on the chassis so that it hangs over the rear of the storage controller by about an inch (2.5 cm).**

21 **Slide the top cover forward until it seats.**

22 **Close the fan cover and engage the fan cover latches. The cover must be completely closed for the storage controller to power on.**

23 **Push the release tabs on the side of each rail and slowly push the storage controller into the rack, making sure no cables obstruct the path of the controller.**

24 **Connect the power cords to the power supplies.**

25 **Verify that standby power is on, indicated by the Power/OK LED flashing on the front panel about two minutes after the power cords are plugged in.**

26 **Use a pen, or other pointed object, to press and release the recessed Power button on the storage controller front panel. The Power/OK LED next to the Power button lights and remains lit.**

27 **Connect data cables to the PCIe card, routing them through the cable management arm.**

28 **Go to the Maintenance > Hardware screen of the BUI and click on the controller and then click Slots to verify the status of the new component.**

29 **Install disk shelf and connect expansion storage.**

▼ Replacing the Battery

You might need to replace the battery if the storage controller fails to maintain the proper time when powered off and not connected to the network. You will need a small (No.1 flat-blade) non-metallic screwdriver or equivalent.

You **must** shutdown the appliance before beginning this task. Note that there will be a loss of access to the storage unless the system is in a 7310 or 7410 clustered configuration. Shut down the appliance using one of the following options:

- Login to the BUI and click the power icon on the left side of the masthead.

- SSH into the storage system and issue the **`maintenance system poweroff`** command.
- SSH or serial console into the service processor and issue the **`stop /SYS`** command.
- Use a pen or non-conducting pointed object to press and release the Power button on the front panel.
- To initiate emergency shutdown, wherein all applications and files will be closed abruptly without saving, press and hold the power button for at least four seconds until the Power/OK LED on the front panel flashes, indicating that the storage controller is in standby power mode.

1. **Disconnect the AC power cords from the rear panel of the storage controller.**
2. **Verify that no cables will be damaged or will interfere when the storage controller is extended from the rack.**
3. **From the front of the storage controller, release the two slide release latches.**
4. **While squeezing the slide release latches, slowly pull the storage controller forward until the slide rails latch.**
5. **Unlatch the fan module door, pull the two release tabs back, rotate the fan door to the open position and hold it there.**
6. **Press the top cover release button and slide the top cover to the rear about a half-inch (1.3 cm).**
7. **Lift up and remove the top cover.**
8. **Locate the PCIe card in slot 0 in the storage controller, see Single and Cluster Controller Configurations for the 7310, the 7110 Overview, 7210 Overview or 7410 Overview.**
9. **Disconnect any data cables connected to the cards on the PCIe 0 riser. Label the cables for proper connection later.**
10. **Loosen the two captive Phillips screws on the end of the rear panel crossbar and lift the crossbar up and back to remove it.**
11. **Loosen the captive retaining screw holding the front end of the riser and the Phillips screw on the end of the riser.**
12. **Remove the riser from slot 0 along with any attached PCIe cards.**
13. **Using a small, non-metallic screwdriver, press the latch and remove the battery from the motherboard.**

14 Press the replacement battery into the motherboard with the positive side (+) facing upward.

15 Replace the PCIe riser into slot 0 with any attached cards.

16 Tighten the screw that secures the riser to the motherboard.

17 Replace the rear panel PCI crossbar by sliding it down over the PCIe risers, ensuring the crossbar is secured with two captive Phillips screws.

18 Place the top cover on the chassis so that is hangs over the rear of the storage controller by about an inch (2.5 cm).

19 Slide the top cover forward until it seats.

20 Close the fan cover and engage the fan cover latches. The cover must be completely closed for the storage controller to power on.

21 Push the release tabs on the side of each rail and slowly push the storage controller into the rack, making sure no cables obstruct the path of the controller.

22 Connect the power cords to the power supplies.

23 Verify that standby power is on, indicated by the Power/OK LED flashing on the front panel about two minutes after the power cords are plugged in.

24 Use a pen, or other pointed object, to press and release the recessed Power button on the storage controller front panel. The Power/OK LED next to the Power button lights and remains lit.

25 Connect data cables to the PCIe card, routing them through the cable management arm.

Next Steps

Set the time using the steps in the BUI Clock task included in the System Administration Guide at http://wikis.sun.com/display/fishworks. (`http://wikis.sun.com/display/fishworks.`)

Shelf

Disk Shelf Overview

The Sun Storage disk shelves (J4400, J4500, 24x3.5" SAS-2) are high-availability serial attached SCSI (SAS) devices in a 4U, 24-disk chassis.

Refer to Disk Shelf Tasks for procedural information about replacing disk shelf components.

The main components are hot-swappable, including the SAS Interface Module (SIM) boards and drives, and the dual load-sharing power supplies and fans. This provides a fault-tolerant environment with no single point of failure. System faults are indicated by an amber colored light on the front panel.

SAS-1

Following is the list of replaceable components of the J4400 disk shelf. CRU components are customer-replaceable, FRU items should be replaced by a Sun service field professional.

Part Number	Description	FRU/CRU
F375-3584-01	SAS Interface Module (SIM) Assembly	CRU
F300-2169-01	764W AC Input Power Supply and Fan Assembly	CRU
F540-7673-01	Z-box with Backplane (J4400 4U chassis)	CRU
F540-7910-01	1TB - 7.2K RPM SATA HDD Assembly	CRU
F540-7754-02	3.5â 18GB STEC SSD Logzilla Assembly	CRU

SAS-2

Following is the list of replaceable components of the Sun Disk Shelf SAS-2. The SAS-2 (Serial Attached SCSI 2.0) storage fabric supports greater number of targets, greater bandwidth, higher reliability and bigger scale. The scale and reliability improvements are achieved with 2 TB SAS disks you can daisy-chain to a total of 12 shelves (288 total disks). In addition,the new, high-performance SAS-2 HBA is designed for the Sun Storage 7000 series with a standard chip set to support a high-density of target devices, capable of attachment to 1024 targets.

With this new fabric, you are encouraged to apply entire shelves to pools, so you can get the benefits of No Single Point of Failure configurations and striping across the maximum possible number of devices.

Part Number	Description	FRU/CRU
F542-0194-01	SAS Interface Module (SIM) Assembly	CRU
F300-2276-01	764W AC Input Power Supply and Fan Assembly	CRU
F540-7980-01	Z-box with Backplane (J4410 4U chassis)	FRU
F542-0274-01	2TB - 7.2K SAS HDD Assembly	CRU
F542-0286-01	SAS 18GB SSD LogZilla	CRU

Shelf Rear Panel

The following figure shows the rear panel of the shelf, though the thumbnail image reflects the J4400 look and feel. Power supplies and fans, SIMs, and disks are hot-pluggable on the storage shelf.

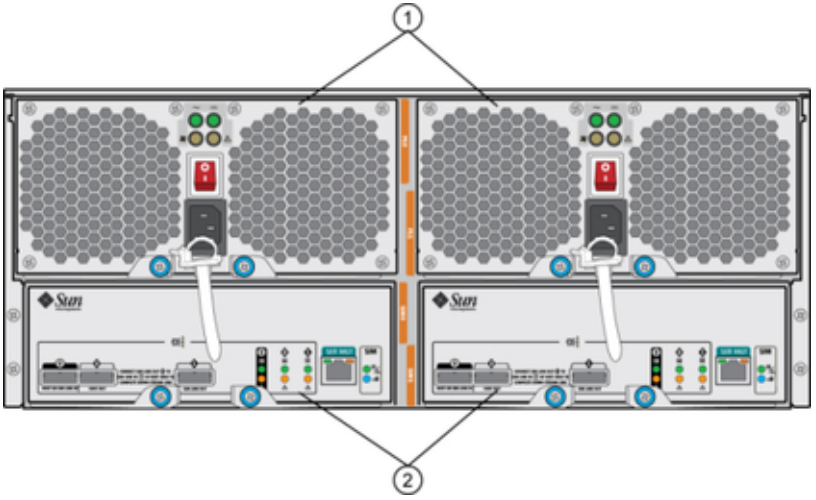


Figure Legend
1 Power supply modules with built-in fans. Power supply 0 is on the left and power supply 1 is on the right.
2 Removable SAS Interface Module (SIM) Boards. SIM 0 is on the left, and SIM 1 is on the right.

Power Supply Exterior

The following figure shows the exterior of the power supply.

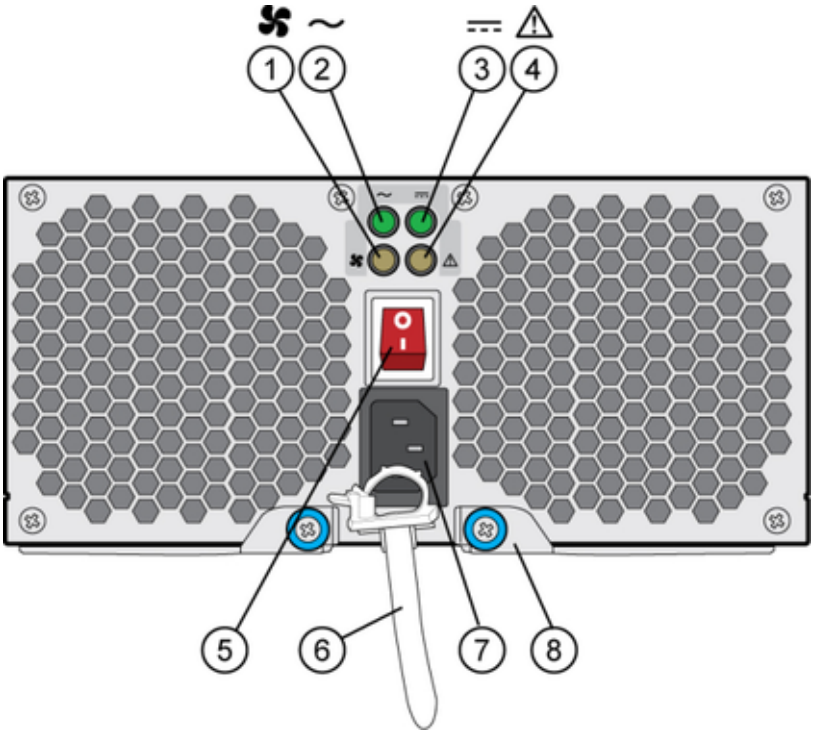
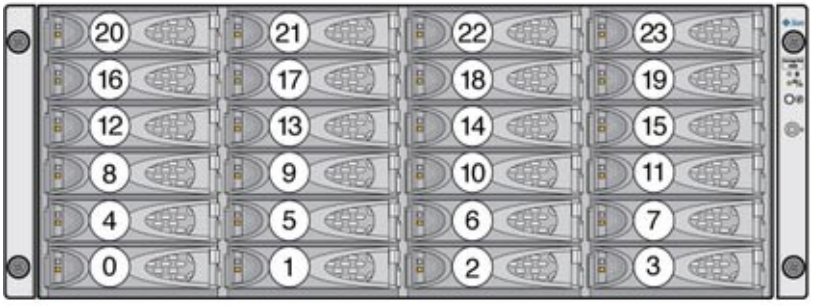


Figure Legend
1 Cooling fan status indicator
2 AC power status indicator
3 DC power status indicator
4 Power supply status indicator
5 Power on/off switch
6 Power cord tie wrap
7 Universal power input connector
8 Right ejection arm and captive screw latch

Shelf Drive Locations

The following figure shows the shelf drive locations for all models, though the thumbnail image reflects the J4400 look and feel.



J4400 Logzilla SSD Locations
Up to four Logzilla SSDs are supported per disk shelf.
Logzilla SSDs should be populated in order of slots 8, 4, 16, and 20.

The following figure shows the Sun Disk Shelf front panel.

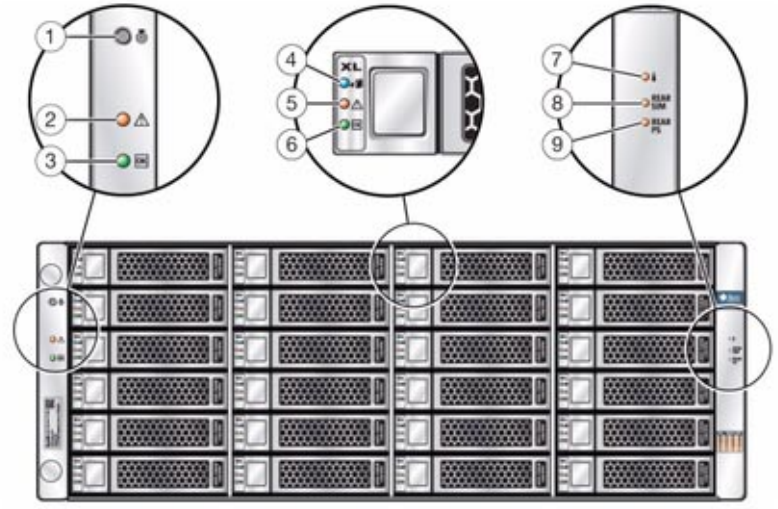


Figure Legend		
1 Locate button and indicator	**4** Disk ready to be removed inidicator	**7** Over temperature warning indicator
2 System fault indicator	**5** Disk fault indicator	**8** SIM board fault indicator
3 System power indicator	**6** disk activity indicator	**9** Power supply fault indicator

Sun Disk Shelf Logzilla SSD Locations
Up to four Logzilla SSDs are supported per disk shelf.
Logzilla SSDs should be populated in order of slots 20, 21, 22, and 23.

Drive Assembly Exterior

The following figure shows the drive assembly exterior for the J4400.

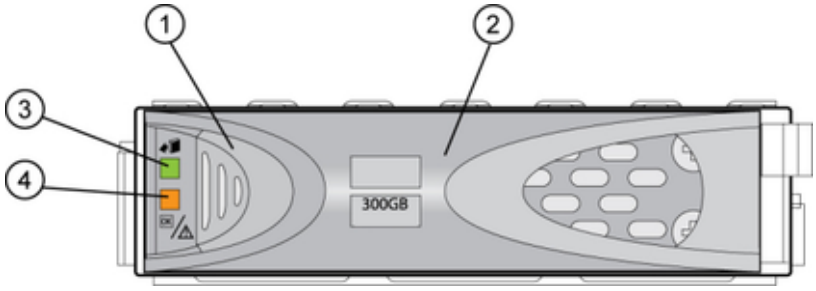


Figure Legend
1 Release button (press to the right to disengage the release handle)
2 Disk Handle
3 OK status indicator
4 Fault status indicator

The following figure shows the drive assembly exterior for the Sun Disk Shelf.

Figure Legend
1 Safe to remove (blue)
2 Fault indicator (amber)
3 Activity indicator (green)

SIM Board Exterior

The following figure shows the SIM board exterior of the J4400 and J4500.

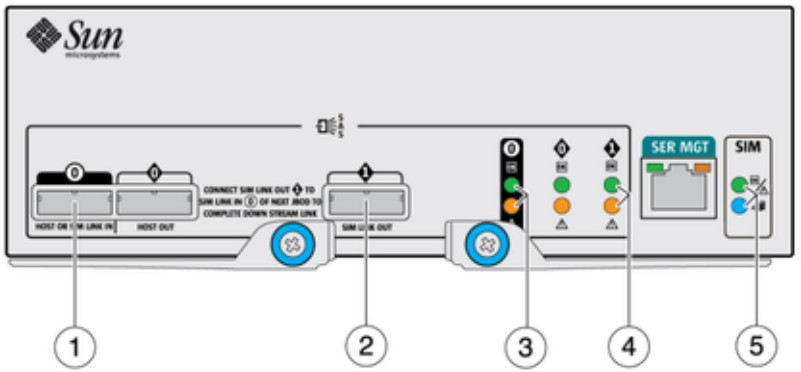


Figure Legend
1 SIM link IN
2 SIM link Out
3 SIM link IN status indicator LEDs
4 SIM link Out status indicator LEDs
5 SIM board Power/OK LEDs

The following figure shows the SIM board exterior of the Sun Disk Shelf SAS-2 and is described in the Legend. Power supplies and fans, SIMs, and disks are hot-pluggable on the shelf.

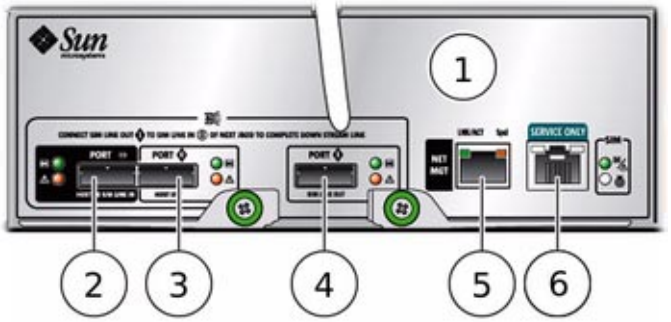


Figure Legend	
1 SIM board 1	**4** SIM link out
2 Host or SIM Link In	**5** Network management port
3 SIM board 0	**6** For Sun service only

The following figure shows the SIM board exterior indicator LEDs.

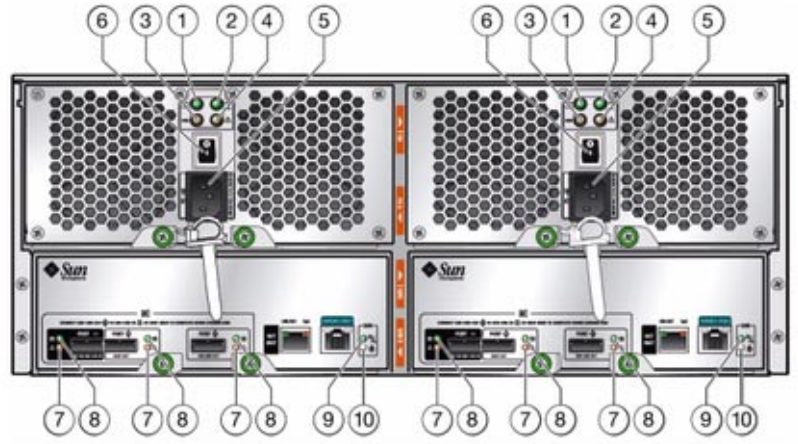


Figure Legend	
1 AC power indicator	**6** Power switch

Figure Legend	
2 DC power indicator	**7** Port fault indicator
3 Fan fault indicator	**8** Port OK indicator
4 Power supply fault indicator	**9** SIM board OK indicator (green)/SIM board fault indicator (amber)
5 Universal power connector	**10** SIM locator indicator

Disk Shelf Configurations

The following tables describe and provide part numbers for the supported expansion storage shelves.

Sun Disk Shelf

Sun Mktg Part Number	MPSR Short Description	Mfg Part Number
DS2-0BASE	Sun Disk Shelf 24x3.5" SAS-2	597-0764-02
DS2-HD2T	Sun Disk Shelf 2TB 7.2Krpm, SAS-2, 3.5", 20xHDD	597-0625-01
DS2X-HD2T	Sun Disk Shelf 2TB 7.2Krpm, SAS-2, 3.5", 24xHDD	594-6670-01
DS2-LOGZ	Sun Disk Shelf 24x3.5" SAS-2	597-0626-01
DS2-FILLER	Sun Disk Shelf 24x3.5", Filler	597-0614-01
DS2X-LOGZ	Sun Disk Shelf 18 GB SAS SSD	594-6629-01

J4400

Sun Mktg Part Number	MPSR Short Description	Mfg Part Number
XTA4400R00A2N12000	Sun Storage J4400, 12xHDD	594-5094-01
XTA4400R00A2N24000	Sun Storage J4400, 24HDD	594-5095-01
XTA4400A2N11SA18	Sun Storage J4400, 11xHDD, 1xSSD	594-5581-01
XTA4400A2N10SA36	Sun Storage J4400, 10xHDD, 2xSSD	594-5582-01
XTA4400A2N23SA18	Sun Storage J4400, 23xHDD, 1xSSD	594-5578-01

Sun Mktg Part Number	MPSR Short Description	Mfg Part Number
XTA4400A2N22SA36	Sun Storage J4400, 22xHDD, 2xSSD	594-5579-01
XTA4400A2N20SA72	Sun Storage J4400, 20xHDD, 4xSSD	594-5580-01

J4500

Sun Mktg Part Number	MPSR Short Description	Mfg Part Number
XTA4500R00A1A24TB	48x500/7K SATA HDD,1xI/O card	602-3875-02
XTA4500R00A1N48TB	48x1TB/7K SATA HDD,1xI/O card	602-4130-02

Shelf

Disk Shelf Maintenance Procedures

This section provides procedural details for customer replaceable units (CRUs) of any disk shelf in the Sun Storage Unified Storage family of products. Refer to Disk Shelf Overview for component specifications and diagrams.

Prerequisites

- Read the information in the overview section for your model and become familiar with the replaceable parts of the system:
- 7110 Overview
- 7210 Overview
- 7310 Overview
- 7410 Overview
- Follow the instructions in the Electrostatic Discharge Precautions section.

Safety Information

Follow all Sun cautions, warnings, and instructions marked on the equipment and described in *Important Safety Information for Sun Hardware Systems* located at http://dlc.sun.com/pdf/816-7190-12/816-7190-12.pdf. (`http://dlc.sun.com/pdf/816-7190-12/816-7190-12.pdf.`)

Electrostatic Discharge Precautions

- Remove all plastic, vinyl, and foam material from the work area.
- Wear an antistatic wrist strap at all times when handling any CRU.
- Before handling any CRU, discharge any static electricity by touching a grounded surface.
- Do not remove a CRU from its antistatic protective bag until you are ready to install it.
- After removing a CRU from the chassis, immediately place it in an antistatic bag or antistatic packaging.
- Handle any card that is part of a CRU by its edges only and avoid touching the components or circuitry.
- Do not slide a CRU over any surface.
- Limit body movement (which builds up static electricity) during the removal and replacement of a CRU.

Tasks

Shelf Tasks

▼ Replacing a Drive

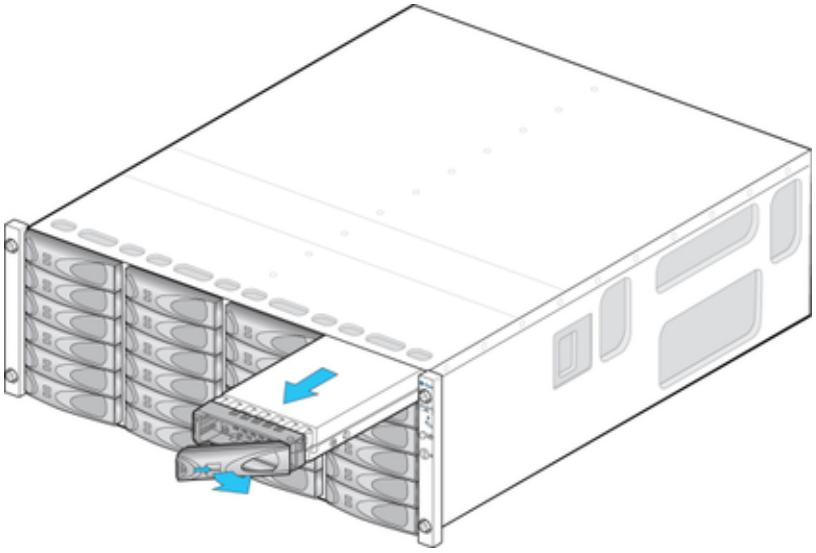
The shelf drives are hot-swappable and may be replaced without removing power from the shelf. The replacement drive must be of the same capacity and type as the drive to be replaced. To avoid possible data loss when removing non-faulted drives, label each drive with the number of the slot from which it was removed and reinstall each drive into the same slot.

Failed drives are indicated by an amber LED. Go to the Maintenance > Hardware section of the BUI and double click the shelf thumbnail to view Details for HDDs or ☼ to turn on the locator LED.

1 Locate the failed disk drive at the front of the chassis.

2 Press the release button in and to the right to release the ejection lever.

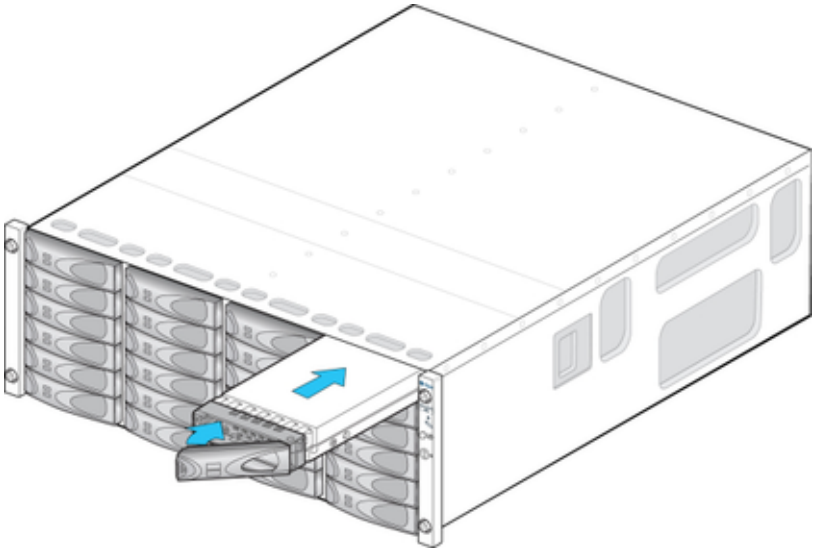
3 **Pull the ejection lever fully open to unlock and partially eject the drive from the chassis.**



4 **Grasp the middle of the drive body and pull it toward you to remove it from the chassis.**

5 **Ensure the new drive ejection lever is in the fully extended position.**

6 **Align the new drive with the open slot and slide the drive into the disk chassis.**



7 **Push the drive into the chassis slot until the ejection lever engages the chassis connectors and begins to swing closed.**

8 **Press the ejection lever closed until it locks in place to seat the drive and lock it into the chassis. The Activity LED with be steady green to indicate a ready state.**

9 **Go to the Maintenance > Hardware screen of the BUI. Click for the controller and then click HDD to verify that the icon is green for the newly installed disk.**

Replacing a Power Supply

The power supplies are hot-swappable and can be replaced without removing power from the system. The power supplies can produce high energy hazard and should only be replaced by instructed individuals with authorized access to the equipment. Failed power supplies are indicated by an amber LED on the rear panel, see the Shelf Rear Panel illustration. Go to the Maintenance > Hardware screen of the BUI. Double click the shelf and then click PSU to view details or to turn on the locator LED.

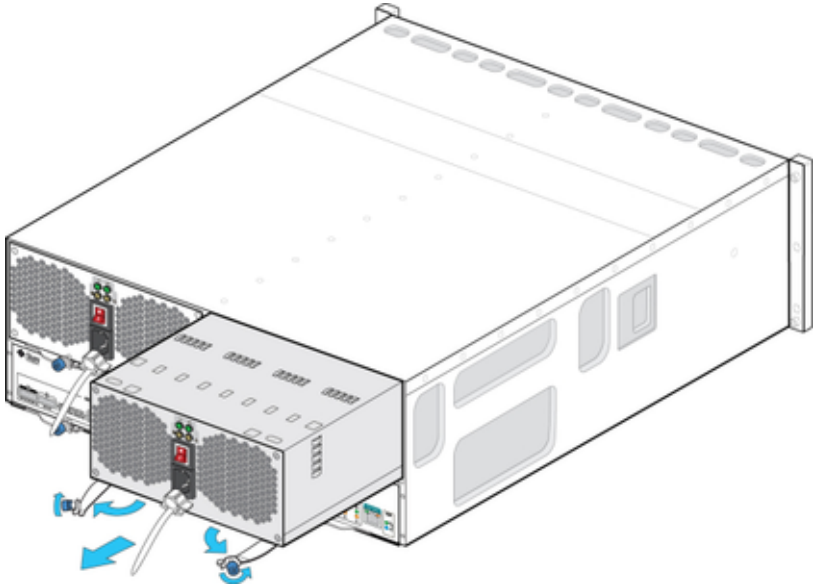
1 **Locate the chassis and failed power supply.**

2 **Ensure the power supply on/off switch is in the "O" off position.**

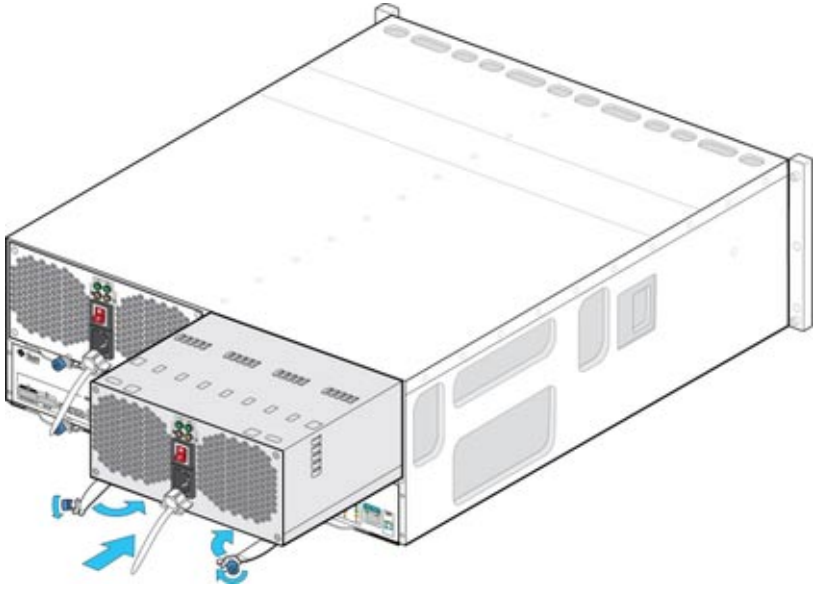
3 **Disconnect the power cord tie strap from the power cord and unplug the power cord from the power supply.**

4 **Using your thumb and forefinger, unscrew both ejection are captive screws until loose and swing the ejection arms out until they are fully open.**

5 **Pull the power supply out of the chassis, being careful not to damage the circuit board connector extending from the back of the power supply.**



6 **With the ejection arms fully open, slide the new power supply into the chassis slot until it contacts the chassis backplane and the ejection arms begin to swing closed.**



7 **Push the ejection arms closed fully and secure both captive screws to seat and secure the power supply in the chassis.**

8 **Ensure the power supply on/off switch is in the "O" off position.**

9 **Plug the power cord into the new power supply and attach the power cord tie strap to the power cord.**

10 **Place the power supply on/off switch to the "I" on position. The Power status LED should be a steady green and the Power status LED and Fan LED should be off.**

11 **Go to the Maintenance > Hardware screen of the BUI. Click for the controller and then click PSU to verify that the icon is green for the newly installed power supply.**

▼ Replacing a SIM Board

The SIM boards are hot-swappable so you can replace them without removing power to the system. The SIM boards are multi-pathed, so you can remove one of the SIM boards at any time, regardless of the state of the blue SIM OK indicator. A faulted SIM board is indicated by an amber LED.

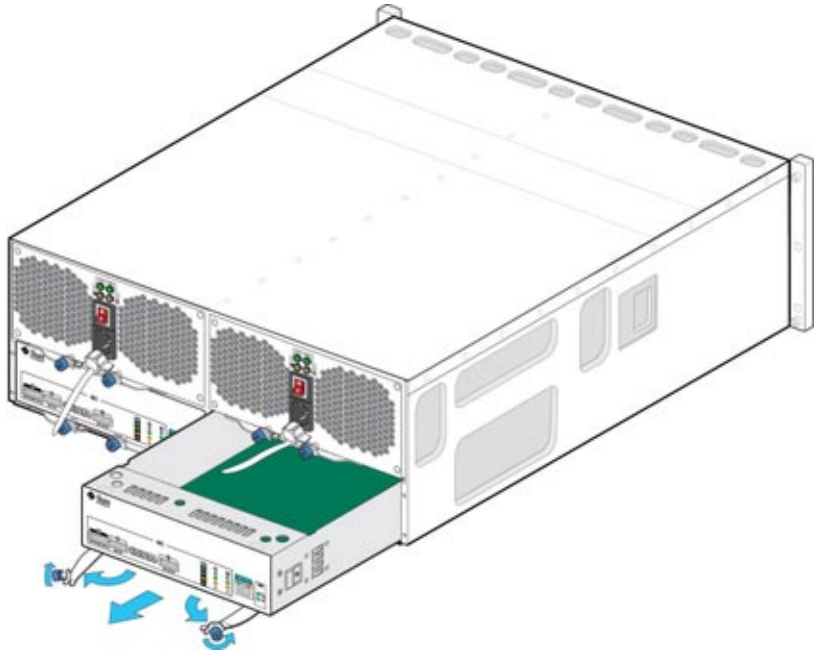
1 **Locate the failed SIM at the back of the disk tray.**

2 **Label and disconnect the tray interface cables.**

3 **Use two hands to disconnect the SAS cable. Grasp the metal body of the connector with one hand and firmly grasp and pull the tab gently toward the connector body with the other, then pull the connector body outward to extract it from the bulkhead. Do not twist or pull the tab in any direction other than parallel with the connector body or you might break the tab. If the tab breaks, use a small sharp object (such as a fine-tipped screwdriver) to lift the metal spring at the top of the connector shell to unlatch it.**

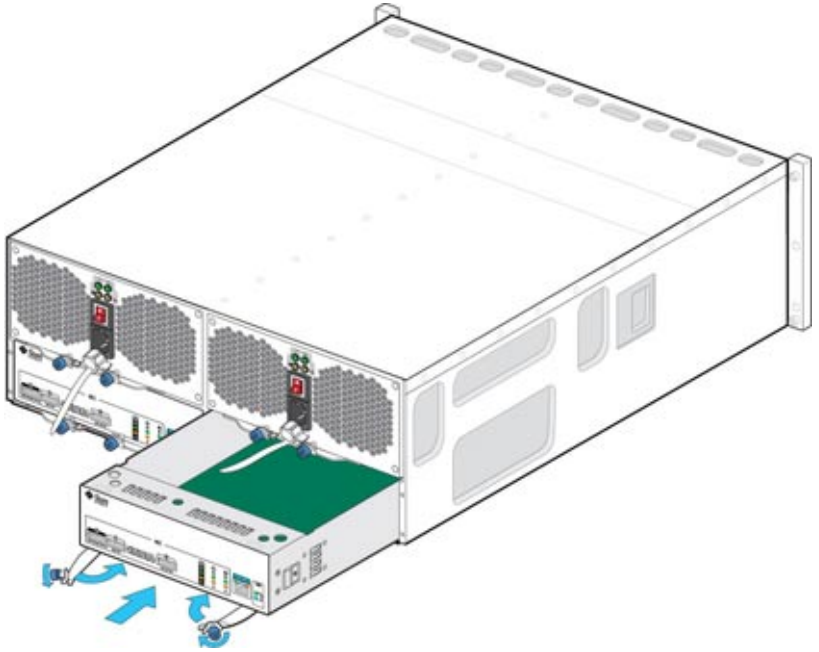
4 **Loosen the two extraction arm captive screws using your thumb and forefinger. If the captive screws are too tight to loosen by hand, use a No.2 Phillips screwdriver to loosen each screw.**

5 **Pull each ejector tab outward and push to the sides to release and partially eject the SIM from the chassis.**



6 **Grasp the middle of the SIM board and slide it out of the slot.**

7 **With the ejector arms in the full open position, align the new SIM board with the open slot and slide it into the tray until the ejector arms contact the tray connectors and begin to swing closed.**



8 **Swing both ejector arms in until they are flush with the SIM board panel to seat the board.**

9 **Tighten both captive screws to secure the board.**

10 **Reconnect the SAS interface cables to their original locations.**

11 **Wait approximately 60 seconds for the SIM board to complete its boot process, at which time the Power LED should be solid green and the SIM locate LED should be off.**

◆ ◆ ◆ CHAPTER 3

System Maintenance

System

Introduction

The Maintenance > System screen provides several system-level features. The screen allows the administrator to:

- View the status of the system disks
- Manage software updates and update the system software
- Create and restore appliance configuration backups
- Create and upload a support bundle
- Repeat the initial setup with existing settings
- Reset the system to the factory defaults
- View pending disk firmware updates

System Disks

The system disks section shows the status of the system disks, and their current usage. The BUI displays this with a pie-chart, and the CLI as a text list. For example:

```
tarpon:> maintenance system disks show
Properties:
                        profile = mirror
                           root = 1.14G
                            var = 52.4M
                         update = 2.52M
                          stash = 14.8M
                           dump = 16.0G
                          cores = 18K
```

```
                        unknown = 39.0G
                           free = 401G

Disks:

DISK        LABEL      STATE
disk-000    HDD 7      healthy
disk-001    HDD 6      healthy
```

The "DISK" column is not visible in the GUI (or needed by the GUI).

Support Bundles

The appliance can generate support bundles containing system configuration information and core files for use by remote support in debugging system failures. Support bundles are generated automatically in response to faults if the Phone Home service is enabled. Administrators can manually generate and upload a support bundle from this section of the Maintenance > System screen.

Once generated, support bundles are automatically uploaded to Sun's Support files Service at http://supportfiles.sun.com/. (`http://supportfiles.sun.com/.`) To facilitate this, the appliance must be connected to the Internet, either directly or through the web proxy configured on the Phone Home service screen. If the appliance fails to upload the bundle, it will try again later.

After a support bundle has been successfully uploaded, it is automatically deleted.

Managing Support Bundles Using the BUI

To generate a support bundle, click the icon next to **`Support Bundles`** on the Maintenance > System screen. You are presented with the randomly generated filename for the support bundle. Provide this filename to support personnel so that they can retrieve your support bundle.

For each support bundle currently being generated or uploaded or which has failed to upload, the following options may be available:

Icon	Description
	Cancel the current operation. If the bundle is being generated, it will be deleted. If the bundle is being uploaded, the upload will be cancelled and the appliance will not retry it later.
	Download the support bundle.
	Try again to upload the bundle to support.

Icon	Description
	Cancel any pending operation and delete the support bundle.

Managing Support Bundles Using the CLI

To generate and upload a new support bundle, use the `sendbundle` command:

```
loader:> maintenance system
loader:maintenance system> sendbundle
A support bundle is being created and sent to Sun. You will receive an alert
when the bundle has finished uploading. Please save the following filename, as
Sun support personnel will need it in order to access the bundle:

   /cores/ak.9a4c3d7b-50c5-6eb9-c2a6-ec9808ae1cd8.tar.gz
```

As the message indicates, you must provide this filename to support personnel in order for them to retrieve your bundle.

Manage bundles from the **`maintenance system bundles`** context in the CLI, as follows:

```
loader:maintenance system> bundles
loader:maintenance system bundles> list
BUNDLE                                                  STATUS      PROGRESS
/cores/ak.9a4c3d7b-50c5-6eb9-c2a6-ec9808ae1cd8.tar.gz   Uploading      7%
loader:maintenance system bundles>
```

Bundles are identified by the filename, omitting the `ak.` prefix and the file type suffix. To delete a support bundle, use the `destroy` command. To view details, use the `select` and `list` commands:

```
loader:maintenance system bundles> select 9a4c3d7b-50c5-6eb9-c2a6-ec9808ae1cd8
loader:maintenance system bundles 9a4c3d7b-50c5-6eb9-c2a6-ec9808ae1cd8> list
Properties:
          filename = /cores/ak.9a4c3d7b-50c5-6eb9-c2a6-ec9808ae1cd8.tar.gz
          status = uploading
                step_progress = 14.709744730821669
```

These read-only properties indicate that the appliance is 14% of the way through uploading the file. To retry a failed upload or cancel a pending operation, use the `retry` and `cancel` commands.

Initial Setup

Initial setup will step through the tasks performed as part of the initial configuration. This will not change any of the current settings unless explicitly requested. User data on the storage pool (including projects and shares) will not be affected.

To perform an initial setup, either:

- In the BUI, click the "INITIAL SETUP" button on the Maintenance > System screen.
- In the CLI, enter the `maintenance system` context, then issue the `setup` command.

Factory Reset

Factory reset will reset the appliance configuration back to factory settings of the current software version, and reboot the appliance. All configuration changes will be lost, and the appliance will need to go through initial configuration again, as when it was first installed. User data on the storage pool (including projects and shares) will not be affected - however the pool will need to be imported as part of the initial setup process.

To perform a factory reset, either:

- In the BUI, click the "FACTORY RESET" button on the Maintenance > System screen.
- In the CLI, enter the `maintenance system` context, then issue the `factoryreset` command.

Factory reset of a single node within a cluster is not supported. The system must be unclustered first.

Updates

System Updates

The system update feature provides customers, developers, and field personnel with the ability to update a system's software after the system is installed.

Software updates are delivered as opaque binary downloads that contain some or all of:

- Management and system software.
- Firmware for internal components such as HBAs and network devices.
- Firmware for disks and flash devices.
- Firmware for external storage enclosure components.

In general, the update release notes describe what is in the update, and the update process automates all of the steps of activating the delivered components.

Procedure

The procedure for updating the system is as follows:

- First, the software update *media* is downloaded from a Sun web site or retrieved from another official source. The media is represented by a single compressed file named after the version number, such as: ak-nas-2010-02-09-1-0.pkg.gz. The file can be renamed if needed, as the true version number is recorded internally within the image. The compressed media packages will vary in size, but typically will be on the order of several hundred megabytes.
- Second, the software media is *uploaded* to the appliance. This can be done via either the BUI or the CLI; see below for details of this operation.
- After the media is uploaded, it will be *unpacked* and *verified*. If all verification checks pass, it will appear in the list of update images as eligible for an update. Any number of images can be maintained on the appliance, subject to a system disk space quota, without actually applying them. If an update has not yet been applied (i.e. is not running and is not a rollback target), it can be deleted via either the BUI or the CLI.
- Administrators should verify that the system is in a healthy state prior to applying the update. The details are described below in the preconditions section.
- After the media is unpacked and verified, the update can be applied. You may be asked to set update options and confirm. For more information on these questions, see the section on deferred updates. If the update is no longer appropriate for the system (because you have skipped past its version number), an error message may be provided. During the update, messages and a progress meter will appear to give some reassurance that the update is proceeding. The installation portion of the update will take about 25 minutes to complete using the current software; however, the full upgrade process may not be complete at that point. See below regarding additional firmware upgrades that may take place following the reboot.
- While the upgrade is in progress, up until the reboot and following the reboot during any firmware upgrades, it is **`non-disruptive`**: the controller continues to provide data services to clients. If the system software fails during the upgrade, it will reboot and continue running the software from before the upgrade. **`Important:`** Do not perform a cluster takeover operation or a reboot while an upgrade is in progress.
- Following the post-upgrade reboot, component firmware will be updated (see firmware updates below) which will take additional time that depends on the size of the system configuration and the amount of firmware that has changed since the previously-installed version was delivered; very large Sun Storage 7410 configurations may take several hours to complete all firmware upgrades once the update itself has been applied.

Preconditions

Best practices include verifying several preconditions prior to applying an update. Whenever possible, administrators should ensure that these preconditions are satisfied immediately prior to applying an update on the storage controller. In a clustered environment, these should be verified on both storage controllers before applying the update to either one.

- Ensure that any resilvering operations have completed. This can be observed in Configuration/Storage or the equivalent CLI context.
- Ensure that there are no active problems.
- Verify that firmware updates are not in progress.
- Check the most recent product release notes for additional preconditions that should be observed for the software release to which you are upgrading.

Deferred Updates

Each update may come with new firmware or updates to external resources. In general, these updates are backwards-compatible and applied automatically without user intervention. There are exceptions, however, for non-reversible updates. These updates involve updating a resource external to the system software in a way that is incompatible with older software releases. Once the update is applied, rolling back to previous versions will result in undefined behavior. For these updates, you will always be given an explicit option of applying them automatically during upgrade or applying them after the fact. They are therefore referred to as "deferred updates".

When applying an update to a version with incompatible version changes, you will be given an option to apply these version changes as part of the upgrade. For each version change, the benefits of applying the change will be presented to you. The default is to not apply them, requiring you to return to the updates view and apply them once the system has rebooted after the upgrade is applied. This allows you to verify that the rest of the software is functional and a rollback is not required before applying the update. As a special case, when updating from the initial 2008.11.20 software release, you will be asked a question about whether to update the ZFS pool version. This is equivalent to applying the deferred update, but is presented as an explicit question.

If you elect to not apply deferred updates during an upgrade, you can return to the updates view at any point to apply the update. If deferred updates are available for the current software version, they will appear as a list below the current set of available updates, with an 'Apply' button to apply the updates. Deferred updates in a cluster take effect on both storage controllers simultaneously, and can only be applied while both controllers are operational. Because deferred updates are listed only for resources present on the local storage controller, in a cluster it may be the case that deferred updates are available only for resources active on the peer controller. In a cluster, it is therefore necessary to check both storage controllers to determine the availability of deferred updates.

Hardware Firmware Updates

Following the application of a software upgrade, any hardware for which the upgrade includes newer versions of firmware will be upgraded. There are several types of devices for which firmware upgrades may be made available; each has distinct characteristics.

Disks, storage enclosures, and certain internal SAS devices will be upgraded in the background. When this is occurring, the firmware upgrade progress will be displayed in the left panel of the Maintenance/System BUI view, or in the `maintenance system updates` CLI context. These firmware updates are almost always hardware related, though it may briefly show some number of outstanding updates when applying certain deferred updates to components other than hardware.

Applying hardware updates is always done in a completely safe manner. This means that the system may be in a state where hardware updates cannot be applied. This is particularly important in the context of the Sun Storage 7310C and 7410C products. During takeover and failback operations, any in-progress firmware upgrade will be completed; pending firmware upgrades will be suspended until the takeover or failback has completed, at which time the restrictions described below will be reevaluated in the context of the new cluster state and, if possible, firmware upgrades will resume. **`Important:`** Unless absolutely necessary, takeover and failback operations should not be performed while firmware upgrades are in progress. The rolling upgrade procedure documented below meets all of these best practices and addresses the per-device-class restrictions described below. It should always be followed when performing upgrades in a clustered environment. In both clustered and non-clustered environments, these criteria will also be reevaluated upon any reboot or diagnostic system software restart, which may cause previously suspended or incomplete firmware upgrades to resume.

- Components internal to the storage controller (such as HBAs and network devices) other than disks and certain SAS devices will generally be upgraded automatically during boot; these upgrades are not visible and will have completed by the time the management interfaces become available.
- Upgrading disk or flash device firmware requires that the device be taken offline during the process. If there is insufficient redundancy in the containing storage pool to allow this operation, the firmware upgrade will not complete and may appear "stalled". Disks and flash devices that are part of a storage pool which is currently in use by the cluster peer, if any, will not be upgraded. Finally, disks and flash devices that are not part of any storage pool will not be upgraded.
- Upgrading the firmware in a disk shelf requires that both back-end storage paths be active to all disks within all enclosures, and for storage to be configured on all shelves to be upgraded. For clusters with at least one active pool on each controller, these restrictions mean that disk shelf firmware upgrade can be performed only a controller that is in the OWNER state.

During the firmware upgrade process, hardware may appear to be removed and inserted, or offlined and onlined. While alerts attributed to these actions are suppressed, if you are viewing the Maintenance/Hardware screen or the Configuration/Storage screen, you may see the effects of these upgrades in the UI in the form of missing or offline devices. This is not a cause for concern; however, if a device remains offline or missing for an extended period of time (several minutes or more) even after refreshing the hardware view, this may be an indication of a problem with the device. Check the Maintenance/Problems view for any relevant faults that

may have been identified. Additionally, in some cases, the controllers in the J4400 disk shelves may remain offline during firmware upgrade. If this occurs, no other controllers will be updated until this condition is fixed. If an enclosure is listed as only having a single path for an extended period of time, check the physical enclosure to determine]whether the green link lights on the back of the SIM are active. If not, remove and re-insert the SIM to re-establish the connection. Verify that all enclosures are reachable by 2 paths.

Reboot After an Update

Following the completion of the update process, the system will reboot automatically. If you have the serial console open, you will notice during this reboot that multiple GRUB menu entries are available, ordered from the newest software (at the top) to the oldest software (at the bottom). The default menu entry will be the top -- the new software to which you just updated. If you do nothing this entry will boot by default, completing the update. The previous entries are *rollback targets* that can be used to initiate a rollback to previous versions of the system software. Rollback is discussed below.

```
   GNU GRUB  version 0.95  (613K lower / 3537536K upper memory)

 +-------------------------------------------------------------------------+
 | Sun Storage 7110 2010.02.09,1-0                                         |
 | Sun Storage 7110 2009.09.01,1-18                                         |
 |                                                                         |
 +-------------------------------------------------------------------------+
      Use the ^ and v keys to select which entry is highlighted.
      Press enter to boot the selected OS, 'e' to edit the
      commands before booting, or 'c' for a command-line.
```

As the system boots up using the new system software, you will see some special messages on the first boot indicating that an update is completing and noting the previous and new versions of the system software:

```
SunOS Release 5.11 Version ak/generic@2010.02.09,1-0 64-bit
Copyright 1983-2010 Sun Microsystems, Inc.  All rights reserved.
Use is subject to license terms.
System update in progress.
Updating from: ak/nas@2009.09.01,1-18
Updating to: ak/nas@2010.02.09,1-0

Updating system datasets ....... done.
Configuring network devices ... done.
Configuring devices.

Sun Storage 7110 Version ak/nas@2010.02.09,1-0
Copyright 2010 Sun Microsystems, Inc.  All rights reserved.
Use is subject to license terms.
```

```
Reading ZFS config: done.
Mounting ZFS filesystems: (27/27)

monk console login:
```

Rollback

The rollback procedure reverts all of the system software and all of the metadata settings of the system back to their state just prior to applying an update. This feature is implemented by taking a snapshot of various aspects of the system before the new update is applied, and rolling back this snapshot to implement the rollback. The implications of rollback are as follows:

- Any appliance configuration changes are reverted and lost. For example, assume you are running version V, and then you update to V+1, and then you change your DNS server. If you execute a rollback, then your DNS server setting modification is effectively undone and removed from the system permanently.
- Conversely, any changes made to *user data* are **not** reverted: if you update from V to V+1, and clients then create directories or modify shares in any way, those changes still exist after the rollback (as you would expect).
- If the appliance is running version V, and has previous rollback targets V-1 and V-2, and you revert all the way to version V-2 (thereby "skipping" V-1), then you not only are removing the system software settings and system software for V, but also for V-1. That is, after a rollback to V-2, it is as if updates V-1 and V never happened. However, the software upload images for V-1 and V will still be saved on the system and you can apply them again after the rollback if you wish by re-executing the update.

If after applying an update, the system is back up and running, you can use either the BUI or the CLI to initiate a rollback to one of two previously applied updates. If the system is not able to run at all after an update, then use the fail-safe rollback procedure.

Fail-safe Rollback

Administrators can execute a fail-safe rollback of the system software from the serial console by selecting one of the other boot menu entries, if present. Although rollback can also be requested from the BUI or CLI, rollback is offered from the boot menu because it is possible that rollback will be needed in scenarios where the new system software has completely failed, i.e. has failed to even boot. To rollback from the console, access the serial console as usual, and during boot, before the ten second timeout, use the arrow key to move the menu selection down to one of the earlier entries:

```
    GNU GRUB  version 0.95  (613K lower / 3537536K upper memory)

 +-------------------------------------------------------------------------+
 | Sun Storage 7110 2010.02.09,1-0                                         |
 | Sun Storage 7110 2009.09.01,1-18                                         |
```

```
|                                                                          |
+--------------------------------------------------------------------------+
     Use the ^ and v keys to select which entry is highlighted.
     Press enter to boot the selected OS, 'e' to edit the
     commands before booting, or 'c' for a command-line.
```

After the rollback boot menu entry is selected, the system will boot the old kernel software, but the rollback must be manually confirmed on the console in order to commit the rollback, which will effectively remove all changes to the system that have happened since, as described above. The confirmation step looks like this:

```
SunOS Release 5.11 Version ak/generic@2009.09.01,1-18 64-bit
Copyright 1983-2009 Sun Microsystems, Inc.  All rights reserved.
Use is subject to license terms.

System rollback in progress.
Rollback to: ak/nas@2009.09.01,1-18

Proceed with system rollback [y,n,?]
```

Entering "y" proceeds with the rollback, and the system will complete boot using the old system software. Entering "n" cancels the rollback and immediately reboots the system, allowing the administrator to select a different boot image (i.e. the current system software or a different rollback).

Cluster Upgrade

In a clustered system, a *rolling upgrade* can be performed, eliminating downtime while the upgrade is performed. This section assumes familiarity with the Sun Storage clustering model: if you are not familiar with the clustering concepts and terminology, please read about clustering concepts in the System Administration Guide first. To describe the rolling upgrade procedure, this document will refer to the two clustered storage controllers as A and B, where A is the controller that will be updated first, and B is the controller that will be updated second. A key best practice in rolling upgrades is that each controller should be upgraded at a time when it is not providing service to clients. The procedure described here meets this requirement. In addition, all general upgrade best practices described above also apply to rolling upgrades.

Important: Do not perform a takeover operation while an upgrade is in progress.

1. Using either the CLI or the BUI, upload the update software image to both storage controllers.
2. If the cluster has a single storage pool, the controller to which that pool is assigned will be designated B; the one without a storage pool is designated A. If the cluster has two or more storage pools and each controller is assigned at least one of them, then decide at this time which controller will be designated A and which will be designated B. The choice is arbitrary, but A's storage pool(s) will be taken over first, so clients using those resource will experience a standard takeover-induced availability delay first.

3. Log in to controller B, go to Configuration/Cluster or the CLI equivalent, and perform a takeover, which will cause controller A to reboot. The software will not prevent you from beginning the upgrade without taking over. However, if you do not perform the takeover, during the upgrade you will be unable to make any changes to the appliance's configuration even though that appliance will continue to provide service, and you will be performing an upgrade on a controller while it is providing service.
4. Using the serial console, or the CLI or BUI if you have dedicated private network interfaces assigned, log in to controller A. Go to Maintenance/System or the CLI equivalent, select the software update, and apply it. At the end of the upgrade procedure, controller A will reboot again, this time running the new system software.
5. Log into controller A and perform a takeover as above. This will cause controller B to reboot and controller A to take control of all resources and provide service to clients.
6. Validate the behavior of the new software and ensure that firmware upgrades complete. Since controller A is now providing service using the new software while B remains on the previous version, this provides an opportunity to ensure that all services are working correctly as seen on client systems. If a serious problem is encountered, roll back the software on controller A, which will cause it to reboot; controller B (still running previous software) will take over, and when controller A recovers it will be running the previous version as well. **`Important:`** Allow all firmware upgrades to complete before proceeding to the next step.
7. Log in to controller B. Go to Maintenance/System or the CLI equivalent, select the desired update, and apply it. At the end of the procedure, storage controller B will reboot again. Controller B will boot up and be running the new system software.
8. The upgrade procedure is now complete. To restore normal operation, log in to storage controller A, go to Configuration/Cluster, and execute a failback operation, returning the resources to their respective assigned controllers.

The following table describes the state of the cluster at the end of each of the steps above, during an update from version V to version V+1.

Step	Controller A State	Controller A Version	Controller B State	Controller B Version
1,2	CLUSTERED	V	CLUSTERED	V
3	STRIPPED	V	OWNER	V
4	STRIPPED	V+1	OWNER	V
5,6	OWNER	V+1	STRIPPED	V
7	OWNER	V+1	STRIPPED	V+1
8	CLUSTERED	V+1	CLUSTERED	V+1

During this time, it is not advisable to make configuration changes to either storage controller while the upgrade is in progress unless absolutely necessary. When the version changes are identical, configuration changes can be made on either head. If configuration changes are required when versions do not match, they can be made in one of two states:

Controller A State	Controller A Version	Controller B State	Controller B Version	Controller Used for Configuration	Propagated to Peer
STRIPPED	V+1	OWNER	V	Controller B	Yes
OWNER	V+1	STRIPPED	V	Controller A	**No**

Note that by following the above procedure, the second state is explicitly avoided because changes made to storage controller A will **not** be propagated to controller B, and should controller B enter the OWNER state, configuration changes would be lost. By following the rolling upgrade procedure, configuration changes can only be applied to controller B, and such changes will persist across the upgrade.

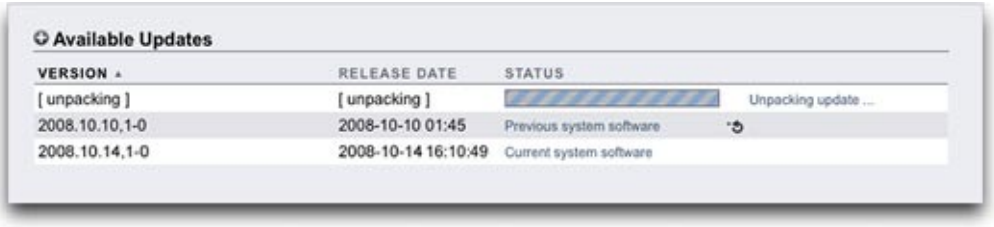
Updating via the BUI

Click the add icon next to **Available Updates** and specify the pathname on your desktop or local client of the update media. During the upload, a progress bar is displayed indicating the progress of the upload:

Note that on some older browsers, the progress bar may not be updated continuously during the upload; if you see a "watch" cursor just wait a minute -- in the worst case the upload will proceed all the way to completion and you may not see the progress bar.

Unpacking and verifying media

This step will happen automatically after the media is done uploading:



Beginning an upgrade

After the update is uploaded, unpacked and verified, it will appear as an update:

Click the information icon to view the Release Notes for the software update.

To begin the upgrade, click on the apply icon. As the upgrade progresses, you will see the most recent message in the status field of the update. To cancel the update at any time (and without ill effect), click on the cancel icon.

Rolling back

To roll back, locate a previous image and click on the rollback icon. You will be asked to confirm that you wish to execute a rollback, and then the system will reboot and execute the rollback. Unlike fail-safe rollback, you will not be asked for further confirmation when the system reboots.

Removing update media

To remove update media, highlight the corresponding row and click on the trash icon.

Applying deferred updates

Any deferred updates will be displayed below the list of available updates. If no deferred updates are available, no list will be displayed. The deferred updates will describe what effects they will have on the system. Clicking the 'Apply' button will apply all available deferred updates. Deferred updates will apply to both nodes in a cluster, and the cluster peer must be up and available to apply any deferred updates.

Updating via the CLI

Because you log into the appliance to use the CLI, the **upload** as described above is actually a **download**. To download the media onto the appliance via the CLI, execute the `download` command in `maintenance system updates`:

```
dory:maintenance system updates> download
dory:maintenance system updates download (uncommitted)> get
                          url = (unset)
                         user = (unset)
                     password = (unset)
```

You must set the "`url`" property to be a valid URL for the download. This may be either local to your network or over the internet. The URL can be either HTTP (beginning with "http://") or FTP (beginning with "ftp://"). If user authentication is required, it may be a part of the URL (e.g. "ftp://myusername:mypasswd@myserver/export/foo"), or you may leave the username and password out of the URL and instead set the user and password properties.

```
dory:maintenance system updates download (uncommitted)> set url=
   ftp://foo/update.pkg.gz
                          url = ftp://foo/update.pkg.gz
dory:maintenance system updates download (uncommitted)> set user=bmc
                         user = bmc
dory:maintenance system updates download (uncommitted)> set password
Enter password:
                     password = ********
dory:maintenance system updates download (uncommitted)> commit
Transferred 157M of 484M (32.3%) ...
```

Unpacking and verifying media

After the file has been transferred, it will be automatically unpacked and verified:

```
dory:maintenance system updates download (uncommitted)> commit
Transferred 484M of 484M (100%) ... done
Unpacking ... done
dory:maintenance system updates> list
UPDATE                           DATE                     STATUS
ak-nas@2009.10.14,1-0-nd         2009-10-14 08:45         AKUP_WAITING
...
```

Beginning an upgrade

To begin an upgrade, select the update that constitutes the upgrade. From this context, you can set any properties specific to the update, including applying deferred updates. For more information on the set of properties available for the particular update, run the `help properties` command. User-controllable properties will begin with the `update_` prefix:

```
clownfish:maintenance system updates ak-nas@2009.04.03,1-0> help properties
Properties that are valid in this context:

   version              => Update media version

   date                 => Update release date

   status               => Update media status

   update_zfs_upgrade   => Apply incompatible storage pool update

clownfish:maintenance system updates ak-nas@2009.04.03,1-0> get
                       version = 2009.04.03,1-0
                          date = 2009-4-3 08:45:01
                        status = AKUP_WAITING
            update_zfs_upgrade = deferred
clownfish:maintenance system updates ak-nas@2009.04.03,1-0> set update_zfs_upgrade=onreboot
            update_zfs_upgrade = onreboot
clownfish:maintenance system updates ak-nas@2009.04.03,1-0>
```

After you set any properties, execute the `upgrade` command. You are prompted for confirmation and (assuming an affirmative) the upgrade begins:

```
dory:maintenance system updates> select ak-nas@2009.10.14,1-0-nd
dory:maintenance system updates ak-nas@2009.10.14,1-0-nd> upgrade
The selected software update requires a system reboot in order to take effect.
The system will automatically reboot at the end of the update process. The
update will take several minutes. At any time during this process, you can
cancel the update with [Control-C].

Are you sure? (Y/N) y
Updating from ... ak/nas@2009.10.11,1-0
Backing up smf(5) ... done.
Loading media metadata ... done.
Selecting alternate product ... SUNW,iwashi
Installing Sun Storage 7110 2009.10.14,1-0
pkg://sun.com/ak/SUNW,iwashi@2009.10.14,1-0:20091014T084500Z
Creating system/boot/ak-nas-2009.10.14_1-0 ... done.
Creating system/root/ak-nas-2009.10.14_1-0 ... done.
...
```

As the upgrade proceeds, the latest message will be printed. You can cancel the upgrade at any time by pressing `^C`, at which point you will be prompted for confirmation:

```
Updating from ... ak/nas@2009.10.11,1-0
Backing up smf(5) ... done.
Loading media metadata ... ^C
This will cancel the current update. Are you sure? (Y/N) y
```

```
error: interrupted by user
dory:maintenance system updates ak-nas@2009.10.14,1-0-nd>
```

Rolling back

To roll back to an earlier version, select the update that corresponds to that version and execute the `rollback` command. You will be asked to confirm that you wish to execute a rollback, and then the system will reboot and execute the rollback. Unlike fail-safe rollback, you will not be asked for further confirmation when the system reboots.

Removing update media

To remove update media, use the `destroy` command, specifying the update to be removed:

```
dory:maintenance system updates> destroy ak-nas@2009.10.14,1-0-nd
This will destroy the update "ak-nas@2009.10.14,1-0-nd". Are you sure? (Y/N) y
dory:maintenance system updates>
```

Applying Deferred updates

To see if there are any available deferred updates, run the `show` command. If deferred updates are available, you can use the `apply` command:

```
clownfish:maintenance system updates> show
Updates:

UPDATE                          DATE                    STATUS
ak-nas@2009.11.20.2.1,1-1.9     2009-4-1 04:18:48       AKUP_PREVIOUS
ak-nas@2009.04.03,1-0           2009-4-3 08:45:01       AKUP_CURRENT

Deferred updates:

The following incompatible updates are available. Applying these updates will
enable new software features as described below, but will prevent older
versions of the software from accessing the underlying resources. You should
apply deferred updates once you have verified that the current software update
is functioning and a rollback is not required. Applying deferred updates in a
cluster will also update any resources on the cluster peer.

1. Support for the "passthrough-x" aclinherit property for shares.
clownfish:maintenance system updates> apply
Applying deferred updates will prevent rolling back to previous versions of
software.

Are you sure? (Y/N)
clownfish:maintenance system updates> apply
```

ConfigurationBackup

Configuration Backup

The configuration backup function enables the administrator to:

- **`Backup`** the appliance configuration, consisting of system metadata only (such as the network configuration, local users and roles, service settings, and other appliance metadata).
- **`Restore`** a previously saved configuration from a backup.
- **`Export`** a saved configuration, as a plain file, so that it may be stored on an external server, or included in a backup of a share on the appliance itself.
- **`Import`** a saved configuration that was previously exported from this system or another system, making it available for a restore operation.

Backup Contents

A configuration backup **`does`** include:

- Metadata associated with the system as a whole, such as settings for NTP, NIS, LDAP, and other services.
- Network device, datalink, and interface configuration.
- User accounts, roles and privileges, preferences, and encrypted passwords for local users (not directory users).
- Alerts and thresholds and their associated rules.

A configuration backup **`does not`** include:

- User data (shares and LUNs). Your user data must be backed up separately, using NDMP backup software, snapshots, and/or remote replication.
- User passwords for directory users. These remain stored solely in your separate network directory service, such as LDAP or Active Directory, and will not be stored in the backup or restored.
- Metadata directly associated with user data, such as snapshot schedules, user quotas, compression settings, and other attributes of shares and LUNs.
- Analytics and logs. Events can be redirected to external SNMP trap receivers or e-mail destinations using Alerts rules.
- System software. The system software is automatically backed up as part of the System Update capability.

Restore Impact

The restore operation takes a selected configuration backup, and modifies all of the corresponding system settings to reflect those in the backup, including removing aspects of the configuration that were not present at the time of the backup. Administrators should adhere to the following guidelines when planning a restore:

- **Scheduled downtime** - The restore process takes several minutes to complete and will impact service to clients, as the active networking configuration and data protocols are reconfigured. Therefore, a configuration restore should only be used on a development system, or during a scheduled downtime.
- **Service interruption** - Clients accessing data on the system through a data protocol such as NFS will see service interrupted, as the network is reconfigured and the NFS service restarted. If the selected backup copy was taken when a service was disabled by the administrator, that setting will be restored, and therefore client sessions will be terminated for that protocol.
- **Session interruption** - If restore is initiated from a web browser, that web browser session will also be disconnected during the restore process as the network is reconfigured. If the restored configuration does not include the same routing and network address settings used by the current browser connection, or if the browser is connected to a network address managed by DHCP, the browser session will be interrupted during the restore. The restore process will complete in the background, but you will need to reload or point the browser at a new, restored network address to continue. For this reason, it may be desirable to initiate a complex configuration restore from the service processor serial console using the CLI.
- **Un-cluster, restore, and re-cluster** - Configuration backups may be initiated for appliances that are joined in a cluster, but a configuration restore may **not** be used while systems are actively clustered. The clustering process means that settings are being synchronized between cluster peers, and each peer appliance also is maintaining private settings. For this reason, you must first un-cluster the two systems, restore the configuration backup on a selected head, and then re-cluster the two systems, at which point the other system will automatically synchronize itself with the restored configuration.
- **Root privileges required** - Configuration backups include all system metadata, and therefore require all possible privileges and authorizations to create or apply. Therefore, unlike other delegated administrative options, **only** the root user is authorized to perform a configuration backup or restore.
- **Verify setting for new features** - It is permitted to restore a configuration that was saved before applying a system update to a new version of the appliance software. In some cases, services and properties that were present at the time of the backup may have different effects, and new services and properties may exist in the newer software that did not exist at the time of the backup. Similar to the system update process, the configuration restore process will make every effort to transfer applicable settings, and apply reasonable defaults

to those properties that did not exist at the time of the backup. When restoring across software versions, administrators should manually verify settings for new features following the restore.

- **Password maintenance** - The root password is **not** changed or reverted to the password at the time of the backup if it was different. The current root password is maintained on the system across the restore. For more details about passwords, refer to the summary of Security Considerations.
- **Import or re-configure storage required** - Storage will be unconfigured after the restore has completed. Administrators should import or reconfigure storage under the Configuration Storage screen after performing a configuration restore.

Security Considerations

A configuration backup contains information that is normally only accessible to the root administrative user on the appliance. Therefore, any configuration backup that is exported to another system or into a filesystem share must apply security restrictions to the backup file to ensure that unauthorized users cannot read the backup file.

Local user passwords are stored in the backup file in encrypted (hashed) format, not as clear text. However, on the system, access to these password hashes is restricted, as they could be used as input to dictionary attacks. Therefore, administrators must carefully protect configuration backups that are exported, either by restricting file access to the backup, or by applying an additional layer of encryption to the entire backup file, or both.

Directory user passwords are **not** stored in the appliance, and therefore are not stored in the configuration backup. If you have deployed a directory service such as LDAP or AD for administrative user access, there are no copies of directory service password hashes for directory users stored in the configuration backup. Only the user name, user ID, preferences, and authorization settings for directory users are stored in the backup and then restored.

Following a configuration restore, the local **root** administrative user password is **not** modified to the root password at the time of the backup. The root password is left as-is, unmodified, by the restore process, to ensure that the password used by the administrator who is executing the restore process (and thus has logged in, using that password) is retained. If the administrator's intent was to also change the root password at the time of configuration restore, that step must be executed manually following the restore, using the normal administrative password change procedure.

Managing Configuration Backups Using the BUI

The following section outlines how various Configuration Backup tasks can be accomplished using the Configuration Backup area near the bottom of the Maintenance > System screen in the BUI.

Create a Configuration Backup

To create a backup, simply click the "Backup" button above the list of saved configurations and follow the instructions. You will be prompted to enter a descriptive comment for the backup.

Restore from a Saved Configuration

Click the rollback icon on any saved configuration to begin the process of reverting the system to that saved configuration. Review the Restore Impact guidance above, and confirm that it is ok to proceed.

Delete a Saved Configuration

To delete a Saved Configuration simply click the trash can icon to delete the configuration that is no longer required.

Export a Saved Configuration

To export a Saved Configuration, mouse over the configuration list entry you wish to export and click the download icon. Your browser will prompt you to save the file locally. The file is a compressed archive whose contents are versioned and may vary over time. You should **not** attempt to unpack or modify the content of the archive, and doing so will render it unable to be imported back to the appliance successfully.

Import a Saved Configuration

To import a previously exported Saved Configuration, click the add icon at the top of the saved configurations list and then use your web browser's file selection dialog to locate the previously exported configuration. You should upload the single, compressed archive file previously saved using the export function.

Managing Configuration Backups Using the CLI

The following section outlines how various Configuration Backup tasks can be accomplished using the CLI in the `maintenance system configs` context.

Listing Configurations

```
host:maintenance system configs> list
CONFIG                               DATE                SYSTEM   VERSION
bfa614d7-1db5-655b-cba5-bd0bb0a1efc4 2009-8-5 17:14:28   host      2009.08.04,1-0
cb2f005f-cf2b-608f-90db-fc7a0503db2a 2009-8-24 17:56:53  host      2009.08.18,1-0
```

Create a Configuration Backup

The `backup` command saves a configuration backup. You will be prompted to enter a descriptive comment for the backup, and then enter `done` to execute the backup operation.

```
host:maintenance system configs> backup
Backup Configuration. Enter a descriptive comment for this configuration, and
click Commit to backup current appliance settings:
host:maintenance system configs conf_backup step0> set comment="pre-upgrade"
                     comment = pre-upgrade
host:maintenance system configs conf_backup step0> done
host:maintenance system configs>
```

Restore from a Saved Configuration

The `restore` command reverts the system to a saved configuration. You will be prompted to enter the universal unique identifier for the backup (see the output of `list`, above), and then enter `done` to execute the restore. Review the Restore Impact guidance above, and confirm that it is ok to proceed.

```
host:maintenance system configs> restore
Restore. Select the configuration to restore:
host:maintenance system configs conf_restore step0>
    set uuid=36756f96-b204-4911-8ed5-fefaf89cad6a
                         uuid = 36756f96-b204-4911-8ed5-fefaf89cad6a
host:maintenance system configs conf_restore step0> done
```

Delete a Saved Configuration

Then the `destroy` command deletes a saved configuration:

```
host:maintenance system configs> destroy cb2f005f-cf2b-608f-90db-fc7a0503db2a
Are you sure you want to delete the saved configuration "new"? y
host:maintenance system configs>
```

Export a Saved Configuration

The `export` command exports a saved configuration, by means of executing an HTTP or FTP PUT operation against a remote HTTP or FTP server. You can also use the export function to export the file to a share on the appliance itself, that has the HTTP or FTP protocol enabled for writing. You can enter a username and password for authentication to the remote server if one is required.

Import a Saved Configuration

The `import` command imports a saved configuration, by means of executing an HTTP or FTP GET operation against a remote HTTP or FTP server. You can also use the import function to import a configuration stored in a share on the appliance itself, that has the HTTP or FTP protocol enabled for reading. You can enter a username and password for authentication to the remote server if one is required.

Problems

Problems

To aid serviceability, the appliance detects persistent hardware failures (*faults*) and software failures (*defects*, often included under faults) and reports them as active problems on this screen. If the phone home service is enabled, active problems are automatically reported to Sun Support, where a support case may be opened depending on the service contract and the nature of the fault. The active problems display is currently only available in the BUI.

Active problems display

For each problem, the appliance reports what happened, when the problem was detected, the severity and type of the problem, and whether it has been phoned home. Below are some example faults as they would be displayed on this screen:

Date	Description	Type	Phoned Home
2009-09-16 13:56:36	SMART health-monitoring firmware reported that a disk failure is imminent.	Major Fault	Never
2009-09-05 17:42:55	A disk of a different type (cache, log, or data) was inserted into a slot. The newly inserted device must be of the same type.	Minor Fault	Never
2009-08-21 16:40:37	The ZFS pool has experienced currently unrecoverable I/O failures.	Major Error	Never
2009-07-16 22:03:22	A memory module is experiencing excessive correctable errors affecting large numbers of pages.	Major Fault	Never

Selecting any fault shows more information about the fault including the impact to the system, affected components, the system's automated response (if any), and the recommended action for the administrator (if any). For hardware faults, you may be able to select the affected hardware component to locate it on the Hardware screen.

Repairing problems

Problems can be repaired by performing the steps described in the suggested action section. This typically involves replacing the physical component (for hardware faults) or reconfiguring and restarting the affected service (for software defects). Repaired problems no longer appear on this screen.

While the system typically detects repairs automatically, in some cases manual intervention may be required. If a problem persists after the affected components have been repaired, contact support. You may be instructed to mark the problem repaired. This should only be done under the direction of service personnel or as part of a documented Sun repair procedure.

Related features

- A persistent log of all faults and defects is available under Logs as the **`Fault log`**.
- Faults and defects are subcategories of Alerts. Filter rules can be configured to cause the appliance to email administrators or perform other actions when faults are detected.

Logs

Introduction

Alerts

This is the appliance alert log, recording key events of interest during appliance operation. The following are example alert log entries as they would appear in the BUI:

Time	Event ID	Description	Type
2009-9-16 13:01:56	f18bbad1-8084-4cab-c950-82ef5b8228ea	An I/O path from slot 'PCIe 0' to chassis 'JBOD #1' has been removed.	Major alert
2009-9-16 13:01:51	8fb8688c-08f2-c994-a6a5-ac6e755e53bb	A disk has been inserted into slot 'HDD 4' of chassis 'JBOD #1'.	Minor alert
2009-9-16 13:01:51	446654fc-b898-6da5-e87e-8d23ff12d5d0	A disk has been inserted into slot 'HDD 15' of chassis 'JBOD #1'.	Minor alert

An info icon next to the Event ID means that extended information is available. Click the icon and this information will be displayed below the list of alerts.

The appliance can also be configured to send email, raise an SNMP trap, or perform other actions when particular alerts occur. This is configured in the Alerts section. All alerts appear in this log, regardless of whether they have actions configured for them.

Faults

The fault log records hardware and software faults. This is a useful reference when troubleshooting hardware failure, as timestamps are available for these hardware fault events.

The following are example fault log entries as they would appear in the BUI:

Date	Event ID	Description	Type
2009-9-5 17:42:35	9e46fc0b-b1a4-4e69-f10f-e7dbe80794fe	The device 'HDD 6' has failed or could not be opened.	Major Fault
2009-9-3 19:20:15	d37cb5cd-88a8-6408-e82d-c05576c52279	External sensors indicate that a fan is no longer operating correctly.	Minor Fault
2009-8-21 16:40:48	c91c7b32-83ce-6da8-e51e-a553964bbdbc	The ZFS pool has experienced currently unrecoverable I/O failures.	Major Error

These faults will generate alert log entries, and so will use the alert reporting settings (such as sending email), if configured. Faults that require administrator attention will appear in Problems.

System

This is the operating system log, available to read via the appliance interfaces. This may be useful when troubleshooting complex issues, but should only be checked after first examining the alert and fault logs.

The following are example system log entries as they would appear in the BUI:

Time	Module	Priority	Description
2009-10-11 14:13:38	ntpdate	error	no server suitable for synchronization found
2009-10-11 14:03:52	genunix	notice	^MSunOS Release 5.11 Version ak/generic@2009.10.10,1-0 64-bit
2009-10-11 14:02:04	genunix	notice	done
2009-10-11 14:02:01	genunix	notice	syncing file systems...
2009-10-11 13:52:16	nxge	warning	WARNING: nxge : ==> nxge_rxdma_databuf_free: DDI

Audit

The audit log records user activity events, including login and logout to the BUI and CLI, and administrative actions. If session annotations are used (see Users), each audit entry should be noted with a reason.

The following are example audit log entries as they would appear in the BUI:

Time	User	Host	Summary	Session Annotation
2009-10-12 05:20:24	root	deimos	Disabled ftp service	
2009-10-12 03:17:05	root	deimos	User logged in	
2009-10-11 22:38:56	root	deimos	Browser session timed out	
2009-10-11 21:13:35	root	<console>	Enabled ftp service	

Phone Home

If Phone Home is used, this log will show communication events with Sun support.

The following are example phone home entry as it would appear in the BUI:

Time	Description	Result
2009-10-12 05:24:09	Uploaded file 'cores/ak.45e5ddd1-ce92-c16e-b5eb-9cb2a8091f1c.tar.gz' to Sun support	OK

BUI

Use the Maintenance > Logs screen to navigate logs using list controls, and switch between logs using the local navigation buttons.

CLI

Logs can be viewed under the `maintenance logs` section of the CLI.

Listing logs

Use the `show` command to list available logs, and the timestamp of the last log entry:

```
caji:> maintenance logs
caji:maintenance logs> show
Logs:

LOG          ENTRIES    LAST
alert        2          2009-10-16 02:44:04
audit        42         2009-10-16 18:19:53
fltlog       2          2009-10-16 02:44:04
scrk         0          -
system       100        2009-10-16 03:51:01
```

Up to 100 recent entries for each log are visible using the CLI.

Viewing a log

Logs may be selected for viewing with the `show` command:

```
caji:maintenance logs> select audit show
Entries:

ENTRY      TIME                SUMMARY
entry-000  2009-10-15 00:59:37 root, <console>, Enabled datalink:nge0 service
entry-001  2009-10-15 00:59:39 root, <console>, Enabled interface:nge0 service
entry-002  2009-10-15 01:00:39 root, <console>, User logged in
entry-003  2009-10-15 01:41:44 root, <console>, Enabled nis service
entry-004  2009-10-15 01:42:01 root, <console>, Imported storage pool "pool-0"
entry-005  2009-10-15 17:56:30 root, <console>, User logged in
entry-006  2009-10-15 17:56:53 root, deimos.sf.fishworks.com, User logged in via
                               CLI
entry-007  2009-10-15 18:00:21 root, deimos.sf.fishworks.com, User logged out of
                               CLI
entry-008  2009-10-15 18:14:47 root, <console>, Browser session timed out
entry-009  2009-10-15 20:46:27 root, deimos.sf.fishworks.com, User logged in via
                               CLI
entry-010  2009-10-15 21:51:46 root, <console>, Rebooted appliance
entry-011  2009-10-15 21:51:46 root, <console>, User logged out
entry-012  2009-10-15 21:56:44 root, deimos.sf.fishworks.com, User logged in via
                               CLI
...
```

Most recent entries are displayed at the bottom of the list.

Entry details

All log entry details are available when selecting that entry and running `show`:

```
caji:maintenance logs> select audit
caji:maintenance logs audit> select entry-000 show
Properties:
                    timestamp = 2009-10-15 00:59:37
                         user = root
                      address = <console>
                      summary = Enabled datalink:nge0 service
                   annotation =
```

The "annotation" is the *session annotation*, which can be enabled when configuring users.

Glossary

7110	Sun Storage 7110 Unified Storage System
7210	Sun Storage 7210 Unified Storage System
7310	Sun Storage 7310 Unified Storage System
7410	Sun Storage 7410 Unified Storage System
Active Directory	Microsoft Active Directory server
Alerts	Configurable log, email or SNMP trap events
Analytics	appliance feature for graphing real-time and historic performance statistics
ARC	Adaptive Replacement Cache
BUI	Browser User Interface
CLI	Command Line Interface
Cluster	Multiple heads connected to shared storage
Controller	See "Storage Controller"
CPU	Central Prcessing Unit
CRU	Customer Replaceable Component
Dashboard	appliance summary display of system health and activity
Dataset	the in-memory and on-disk data for a statistic from Analytics
DIMM	dual in-line memory module
Disk Shelf	the expansion storage shelf that is connected to the head node
DNS	Domain Name Service
DTrace	a comprehensive dynamic tracing framework for troubleshooting kernel and application problems on production systems in real-time
FC	Fibre Channel
FRU	Field Replaceable Component

FTP	File Transfer Protocol
GigE	Gigabit Ethernet
HBA	Host Bus Adapter
HCA	Host Channel Adapter
HDD	Hard Disk Drive
HTTP	HyperText Transfer Protocol
Hybrid Storage Pool	combines disk, flash, and DRAM into a single coherent and seamless data store.
Icons	icons visible in the BUI
iSCSI	Internet Small Computer System Interface
Kiosk	a restricted BUI mode where a user may only view one specific screen
L2ARC	Level 2 Adaptive Replacement Cache
LDAP	Lightweight Directory Access Protocol
LED	light-emitting diode
Logzilla	write IOPS accelerator
LUN	Logical Unit
Masthead	top section of BUI screen
Modal Dialog	a new screen element for a specific function
NFS	Network File System
NIC	Network Interface Card
NIS	Network Information Service
PCIe	Peripheral Component Interconnect Express
Pool	provide storage space that is shared across all filesystems and LUNs
Project	a collection of shares
PSU	Power Supply Unit
QDR	quad data rate
Readzilla	read-optimized flash SSD for the L2ARC
Remote Replication	replicating shares to another appliance

Rollback	reverts all of the system software and all of the metadata settings of the system back to their state just prior to applying an update
SAS	Serial Attached SCSI
SAS-2	Serial Attached SCSI 2.0
SATA	Serial ATA
Schema	configurable properties for shares
Scripting	automating CLI tasks
Service	appliance service software
Share	ZFS filesystem shared using data protocols
SIM	SAS Interface Module
Snapshot	an image of a share
SSD	Solid State Drive
SSH	Secure Shell
Statistic	a metric visible from Analytics
Storage Controller	the head node of the appliance
Support Bundle	auto-generated files containing system configuration information and core files for use by remote support in debugging system failures
Title Bar	local navigation and function section of BUI screen
Updates	software or firmware updates
WebDAV	Web based Distributed Authoring and Versioning
ZFS	on-disk data storage subsystem

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